

# **The American Journal of Pharmaceutical .... Education ....**

**The Fifty-fourth Annual Meeting will be held in Salt Lake City, Utah,  
during the week of August 16, 1953**

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**THE OFFICIAL PUBLICATION OF THE AMERICAN  
ASSOCIATION OF COLLEGES OF PHARMACY**

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**"The public standing and recognition of pharmacy as a profession are determined by moral character as well as by the scientific competency of its practitioners."—The Pharmaceutical Survey.**

**"Attempts by an individual teacher or by a small group to work against the enveloping tide of immorality may appear futile and become discouraging yet this is the kind of job that requires individual effort and the courage and support found best in small groups. In the matter of developing professional morality, the spirit and behavior of teachers is of far greater consequence than the imparting of factual knowledge."—Allen I. White, State College of Washington.**

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## The Education of Teachers of Pharmaceutical Chemistry

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Associate Chief for Education in the Health Professions  
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This seminar takes me back to the day when Dr. Edward C. Elliott and I talked about the recommendations which The Pharmaceutical Survey should make concerning the improvement of teaching in the colleges of pharmacy—a subject in which he was much concerned. I had previously written a book on teaching in which were described the summer schools for teachers of engineering conducted from 1927 to 1933, and resumed in 1939. Dr. Elliott was well acquainted with that project for while he was president of Purdue University two of those summer schools were held on its campus. He soon made a proposal to the American Association of Colleges of Pharmacy and the American Foundation for Pharmaceutical Education that they cooperate in the conduct of summer seminars for teachers of pharmaceutical subjects. As a result, these seminars got under way in 1949 with the one on pharmacy at the University of Wisconsin.

It is a source of personal satisfaction to me to observe the success of the summer seminar idea for teachers in the colleges of pharmacy. Moreover, it is a distinct pleasure to me to participate in this Teachers' Seminar on Pharmaceutical Chemistry. I hope to make a contribution, small though it may be. Even more, I expect to learn a great deal from the papers to be presented and from your discussions.

So much by way of introduction. In my paper I want first to describe the work of the college and university teacher, to refer to the complex character of these activities, to indicate some of the qualities of mind and heart which help to make a teacher successful, and lastly to suggest the training a college teacher should have with some reference to the teacher of pharmaceutical chemistry.

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A paper read to the Teachers' Seminar on Pharmaceutical Chemistry, University of Michigan, College of Pharmacy, July 7, 1952.

### **Work of the Teacher**

For our purposes we need to give attention to six different activities and functions of the teacher. The *first* of these is for him to establish the objectives his students are to attain. Teaching is an activity that is aimed at accomplishing certain goals. Without them it has no direction, it becomes movement without much intelligence and produces limited and uncertain results. Perhaps the sharpest criticism that can be made of a teacher is that he does not really know where he is going or what he is doing. And yet how often the charge is made that what goes on in many college and university classes is essentially aimless and confusing, that much of it is lost in a fog because it is not directed toward the accomplishment of definite purposes.

It is a common observation that there is widespread inability on the part of teachers to state what results are desired out of individual courses. Many teachers have not thought in such terms. They teach what they were taught, what the textbook contains, or what they are interested in at the moment, seldom giving thought to the questions: What am I trying to accomplish? What do I want the student to get out of the course? These questions he must ask of himself frequently and answer them intelligently.

*Second*, the teacher has to prepare his courses. To do this well requires considerable effort and time. To be carried out adequately the comprehensive planning should usually be done during a period when work can proceed on it without hurry or much interruption, and well in advance of the time when instruction begins. It may start with the formulation of the objectives to be accomplished through the course. It then proceeds to the preparation of an outline of the subject matter to be used and the things to be done, divided into a series of units or topics that are arranged in logical order and set to the calendar.

A well designed plan for a course makes teaching an orderly process, assures the maintenance of perspective, helps to place emphasis at appropriate points, and guides the work to the desired conclusion. If the plan is placed in the hands of students, it provides for them a view of what they are expected to accomplish and enables them to cooperate understandingly with the teacher. Such a simple procedure — workmanlike, systematic, well-ordered — is much prized by students. It enables them at all times to know where

they are, what they need to do. It enables them also to plan their work—and that is most helpful, for they are besieged by numerous demands, some of which are unanticipated.

And the planning of courses is a never-ending process. The alert teacher is always on the lookout for ways and means to improve his course plans.

The idea I am suggesting here is quite in contrast with what students sometimes report about teachers. I am reminded of the teacher of economics who told a colleague that he could not understand why students no longer filled his classes as they did twenty years ago when he gave exactly the same lectures!

For myself, one of the chief joys of teaching is derived from the planning of courses. I have found it a most stimulating activity which leads to new insights and develops new perspectives. On a few occasions it has been necessary for me to teach courses which, because of circumstances I could not control, I was not able to plan in advance. On these occasions I was never happy with my work nor altogether pleased with the results.

*Third*, the college or university teacher needs to make daily preparation for the sessions with his classes. A well planned and prepared lesson is essential to any meeting with a class. The lack of such daily preparation is a common cause of failure. Often it results in much improvising and bluffing on the part of the teacher. He may even sink to the low level of resorting to his own autobiography in order to use up the time.

There are two phases of this daily preparation: the study and review of the subject matter to get it clearly in hand and the planning of the classroom work. The teacher's study of the subject matter consists partly of renewing knowledge he has previously acquired, clearing up hazy ideas, recapturing the details, and getting the relationships clearly in mind. In this study he also may acquire new knowledge and fresh points of view. The planning of the daily work consists in determining the objective of the lesson and selecting or devising the means to be used in realizing the objective. Time allotments may be made to the various parts of the class work. Leading questions, problems, and exercises should be designed. If illustrative materials are to be used, they should have particular attention in order to assure that they will be on hand at the ap-

pointed time and will serve the purpose intended. Such thoughtful daily preparation is a long step toward success in teaching.

One further word regarding this matter. Careful planning is characteristic of sensible and intelligent persons in all difficult undertakings. It is particularly needed in the work of teaching, where one may so easily do the wrong thing, waste time and effort, and fail to obtain the results that should rightly be expected. Only one who is willing to make the necessary preparation should have a place in the classroom as a teacher. Only one who concerns himself with the careful preparation of his courses and of his daily work is likely to generate the enthusiasm that makes of him an inspiring teacher.

*Fourth*, the teacher conducts the session of the class. Here his work reaches its culmination—the climax for which he has prepared. It is the supreme test of his resourcefulness and ingenuity. Here within fifty precious minutes he has an opportunity to achieve great things in the lives of his students. The pity is that so often the opportunity is neither appreciated nor lived up to.

The college and university teacher may employ a number of methods of teaching. He may lecture, he may arrange and direct various kinds of discussion, he may use a question and answer procedure, and he may employ a variety of visual aids and forms of direct experience with objects, situations, and activities. As an accomplished teacher he should be competent to use any and all of them as they appear to be the most appropriate means of accomplishing his purposes. The one procedure that is much overused, grossly abused, and often badly employed is the lecture.

In my opinion a class session should be a cooperative undertaking in which the teacher and the class join with interest and zest. The teacher should work with the class as well as manage it. He should be not only a master but also a comrade. There should always be vital communication between the teacher and the taught.

The teacher should not be primarily a purveyor of information; that can generally be had better from printed sources. His function transcends that of imparting data; rather it is to serve as leader, interpreter, and guide to students as they use information to acquire new concepts, understandings, and insights. Someone has characterized the true teacher as a consulting architect who is assisting the student to build his structure.



The meeting of the class should be primarily an exercise in thinking, both for the students *and* for the teacher. If it is largely anything else, it is likely to be dull and uninspiring. I like to think of the classroom exercise as an adventure with ideas. What a thrill it affords when conducted in that light.

In the classroom the teacher needs to remember that he is teaching individuals; the group as a group does not learn. May I quote a cogent statement from Professor William Lyon Phelps of Yale University. In his lecture on *The Excitement of Teaching* he says: . . . whenever I enter a classroom filled with young men, I think of them not as a class or a group; but as a collection of individual personalities, more delicate, more intricate than any machinery. Not only is every student an organism more sensitive than any mechanical product, every student is infinitely precious to some parent or to some relative who may be three thousand miles away . . . The officials at the United States Mint, the head of a diamond mine, the president of a metropolitan bank are not dealing with material so valuable as that in the hands of the teacher. Their mistakes are not so disastrous as his; their success is not so important."

Fortunate indeed is that class whose teacher has such a humane attitude toward its members.

The final test of the class session is the result it has produced. Have the students reached new understandings, acquired new insights, and gained new views and horizons; have they grasped more fully the nature of their undertaking; have they learned to think more clearly and soundly; have they received new inspiration to achieve their best?—these are among the solid accomplishments that should flow from the contact between teacher and student in the classroom.

The *fifth* function of the teacher is to counsel with students. It is true, of course, that a considerable part of the counseling of students is delegated to particular officials such as deans and faculty advisers, and that is as it should be. But every teacher who is genuinely interested in students and respected by them has many occasions to advise students, sometimes in regard to a particular course, and sometimes about other matters of mutual concern. In an institution where a large share of the instruction must necessarily be in groups, sometimes large, the contacts between teachers and

individuals students often become of great significance in the progress of the student. Moreover, these contacts are essential for the teacher who wants to understand his students in order that he may serve them well.

The *sixth* part of the teacher's work is to evaluate the accomplishments of his students. I need hardly remind you that a test or an examination should be an effort to discover whether students have accomplished the objectives set for them. That being the purpose, the examination questions should be definitely based upon the objectives. All too often the questions have no particular purpose other than to sample the student's information.

The examination, like every other phase of the teacher's work, should be carefully planned. The preparation of sound examination questions is not an occupation for an amateur. In doing it there is much at stake, both from the point of view of sound education as well as from the point of view of justice to students.

In recent years test experts have developed an extensive set of ideas and principles regarding examinations. Today no teacher need be uninformed about good practices in the examination function.

Up to this point I have tried to outline briefly the work of the college or university teacher as I see it. This work, if it is well done, makes heavy demands on him. It is necessary that he begin with a wealth of resources, that he shall replenish those resources as he goes on with his work, and that he shall possess a continuing enthusiasm for his work.

### **Equipment of the College Teacher**

Let us now look briefly at the equipment a college or university teacher should possess. When one considers this matter, he usually thinks *first* of scholarship, that is, a mastery of the knowledge and skill which is to be taught. This equipment is absolutely essential; without it the blind try to lead the blind, the ignorant attempt to direct others who are likewise ignorant. Surely it is not possible for one to teach his students adequately unless he himself has first become a master of what the students are called upon to learn.

But it is not enough that one shall know the subject matter he teaches; he should have gone far beyond this point. He should have proceeded to the place where he has acquired a broad perspective in his field, a comprehension of his subject in its various relationships,

and ability to think constructively in his field of learning. Moreover, his scholarship should have a dynamic quality—ever expanding and renewing itself as he continues his work of teaching. In short, he should have reached the point where he is no longer a mere imitator of others, but where he speaks in his own right and from firsthand direct experience in his field of learning.

Teaching is creative work which calls for broad and profound scholarship. Let me digress briefly here to consider the meaning of scholarship. It is necessary for our purposes to distinguish between two terms—scholarship and research. Here I want to quote a helpful statement from Professor W. H. Cowley of Stanford University:

"Research is the effort to discover new facts or to recover lost or forgotten facts: it is the empirical element in the quest for understanding the nature of the universe and of man.

"Scholarship is the organization, criticism, and interpretation of facts and thoughts about facts: it is the rationalistic element in the pursuit of understanding. These two activities, I would reemphasize, supplement one another, depend upon one another, *require* one another. To prosper they must fertilize each other; and if one suffers, so also does the other. I would also reemphasize what seems to me to be a fact of the expanding complexity of knowledge; that few men can be both research scientists and interpretive scholars and that therefore we have been forced to specialize the two functions. Yet empirical research workers and rationalistic scholars must work together cooperatively fructifying their different but inter-dependent duties.

"The definitions just given make it possible to move on to the appraisal of the relation of the higher education to each of the two segments of the higher learning, the empirical or research segment and the rationalistic or scholarly segment." (Fred J. Kelly, *Toward Better College Teaching*, U. S. Office of Education Bulletin 1950, No. 13, p. 18.)

Professor Cowley then goes on to speak of the relationships of research, scholarship, and teaching by saying:

"To perceive these three processes clearly also leads to the awareness that research *per se* has no *direct* relationship to teaching and that scholarship must stand between them and join their hands. Before research data become teachable, they must go through the intermediate stage of scholarship, the stage of arrangement, criticism, and explanation. This means that everyone who is to devote his major energies to college teaching should be trained in the skills of scholarship and that the primary emphasis in his graduate training should be, therefore, upon the organization, criticism, and interpretation of the facts turned up by research people. This will involve enough association with the research

enterprise to understand both its insistent importance and its methodology, but it need not involve concentrated and continuous participation in research investigations. Instead, attention must be directed to scholarship *per se* and also to the acquisition of skill in communicating the results of research and scholarship in able teaching. People can learn to teach, but such learning must rest upon the foundation of sound and continuous scholarship.

"Those who proclaim that no one can be a good teacher unless he does empirical research simply ignore the abounding evidence that many great and good teachers are not research men and never have been. Yet these critics of 'mere teaching' and 'mere teachers' would be as right as truth if they would modify their statement to read: 'No one can be a good teacher unless he keeps continuously organizing, criticizing, and interpreting the data, new and old, of his subject—unless, in short, he's a scholar.' " (Ibid., p. 22)

We do well, then, to differentiate between empirical research and rationalizing scholarship. We have a conflict today because there are those who would emphasize research largely to the neglect of interpretive scholarship. Only scholar-teachers are likely to be good teachers.

The *second* aspect of the college or university teacher's equipment should be an acquaintance with pedagogical method and considerable skill in using it. He needs to know how a student learns his subject, chemistry, for example, and how it can best be taught. A very common cause of failure in teaching, as is clearly shown by objective studies at both lower and higher levels of teaching, is the use of poor teaching methods. These inadequate or wrong methods are nearly always the result of a failure to understand the principles of learning and a failure to organize learning experiences in such ways that students can comprehend them. In some academic quarters one notes a disposition to deny the importance of methods of teaching, a disposition not so much in evidence now as formerly, since students are becoming more outspoken in their criticism of teachers who have not acquired the art of doing that for which they are paid. Nevertheless, one would hardly be warranted in saying that the study of methods of teaching is wholeheartedly accepted as an integral component of preparation for college and university teaching. Indeed, the most marked defect in the preparation of college and university teachers is the lack of effort devoted to the specialized activities of teaching. It may be true that a few human beings are born with a genius to teach, but the great

majority of those who aspire to become good teachers must learn the art through study, observation, and practice, just as one learns to do well any complicated activity.

*Third*, one may have acquired sufficient scholarship and a considerable knowledge of how to teach, together with some skill in using both, and yet be a poor teacher. He may not be an effective teacher because of a lack of an elusive factor which, for want of a more precise term, is generally called personality. Sometimes it is pointed out that too many teachers are colorless, queer, poorly adjusted, self-centered, and ungenteel in act and manner.

The personality of the teacher, like his scholarship and his pedagogical competence, bears directly on how he fulfills his functions. One who is friendly, sociable, and interested in people, and particularly in students, will teach very differently from one who is unfriendly, conceited, and selfish. Certainly a teacher who lacks interest in his work and whose mental activity is sluggish and dull will not perform his functions in the same way as one who is enthusiastic about his work and whose mind is keen and alert.

These three aspects of the equipment of a good college or university teacher, a teacher of pharmaceutical chemistry—scholarship and skill in his subject or field of instruction, acquaintance with pedagogical method and skill in its use, and a pleasing and inspiring personality—constitute essential factors in his success. They go a long way to insure satisfactory teaching service.

### **Education of Teachers of Pharmaceutical Chemistry**

A significant step in developing teachers of pharmaceutical chemistry is to find the right persons. In my judgment the faculty of a college of pharmacy should always be on the alert to discover among the undergraduate students those who have a possibility of becoming good teachers. As soon as such a student is found, he should be encouraged to consider a career of teaching.

As far as possible, the undergraduate education of a prospective teacher of pharmaceutical chemistry should develop in him those qualities, interest, and abilities that will contribute directly toward a teaching career. Certainly a liberal amount of education in the humanities and the social sciences is most desirable. Indeed, I regard it as essential for one who is going to be a teacher of young people preparing for any profession. Moreover, the undergraduate education should have been acquired with a good record. Both of

these elements—a broad general education and a good academic achievement—become the foundation, and deficiency in either will surely prove to be a handicap to a teacher. Graduate education does not aim at patching up deficiencies and shortcomings of the foundation, and it will not succeed in doing that.

The undergraduate education of students who plan to take graduate work in order to become teachers of pharmaceutical chemistry should be adapted to their particular needs. Certainly courses in a modern foreign language, the calculus, and physical chemistry should be a part of the undergraduate curriculum for such students. Time for such courses might be had by omitting for these students some or all of the courses in pharmacy administration. Substantial courses in English composition and public speaking are essential. Some undergraduate study of educational psychology and education, as electives, would be helpful by way of developing in the student some acquaintance with educational work.

Do I hear someone say that such a foundation as I am suggesting for graduate study cannot be provided by the current 4-year undergraduate curriculum in pharmacy? I fear your contention may be well founded. I believe, however, that before too long the undergraduate curriculum in pharmacy will be lengthened by adding one or two years for prepharmacy education. When that is done, the students can be well prepared for graduate study.

Graduate education in pharmaceutical chemistry is generally regarded as a *sine qua non* for teachers of the subject. We are approaching the time when the degree of Doctor of Philosophy will be the common requirement. Of what should this graduate education consist? What should be its character?

The major part of this education, I take it, should be an effort to make of the student a reasonably accomplished scholar in the field of study he will teach. To this objective he will devote his major effort.

In recent years we have been hearing a good deal of criticism of the programs of the graduate schools with respect to the preparation of college and university teachers. Two weaknesses are pointed out. *First*, it is said that graduate students are too narrowly educated to become good teachers of undergraduate students; they specialize too highly. Graduate students, it is said, lack ability to see the relationship of their subject to other subjects; they are



unable to synthesize knowledge; they are not able to relate the material in their own specialities to cognate fields or interpret the meaning of their subject in terms of the wider area. Not only do the graduates not know the materials in cognate fields, but they are not interested in them. After these students become teachers their teaching, it is said, is pitched to the level of specialists rather than to the level of students who are but building the foundations of understanding in a broader field. There is no doubt that the high degree of specialization may be appropriate for one who plans to spend his life as a research worker but not for one whose primary work will be to teach.

The second weakness of a great deal of graduate education from the point of view of developing teachers is that the interest of the graduate school is centered in research and developing research workers rather than in teaching and making good teachers of the students. The criticism is made that the current emphasis on research in the Ph.D. programs tends to steep the graduate students "in the idea that their satisfaction as well as their rewards will come from research rather than from teaching." Young teachers prepared in the graduate schools, it is said, "look upon their period of undergraduate teaching as a necessary and not too pleasant experience through which they must go on their way to a professorship which they hope will be devoted largely to research." (Kelly, *op. cit.*, p. 6.)

I believe there is no question that training in research, if not too narrowly conceived, is important for prospective college and university teachers. As a method of study it should be understood and appreciated by all of them. Its principal function is to teach students how to obtain and use evidence. I shall probably never forget a casual remark of my major professor at the University of Chicago when we were talking over my dissertation. He said he had long ago come to realize that the main objective of the dissertation should be the training which the student receives rather than the original contribution to knowledge which a dissertation is presumed to make. That remark suggests what I regard as a sound point of view concerning the place of research in the preparation of a teacher. The search for truth is the responsibility of everyone who deals with ideas and who teaches young people; he should know the problems involved in seeking out truth, in discovering

facts and interpreting them. It seems reasonable, therefore, that all graduate students planning to teach should actually engage in a sufficient amount of research to learn its methods and understand its meaning.

I would suggest, however, that the idea of research should be extended and construed with some insight and imagination if it is to provide for the prospective teacher the opportunity that will serve his purposes well. He should be called upon to demonstrate that he is interested in and able to engage fruitfully in interpretive, independent study. Here I should want to follow a recent report which says:

"The kind of research a man should engage in should be determined by his particular interests and capacities. If he has a capacity for detail and for finding and using knowledge of this sort, his work should be planned to make sure he has an opportunity to do something worth doing that uses these interests and capacities. If he has a capacity for organizing, synthesizing, and interpreting knowledge and ideas, his advisers should see that he has an opportunity for work which uses and develops these capacities." (*The Preparation of College Teachers*, edited by Theodore C. Glegen and Russell M. Cooper, Washington, D. C., American Council on Education, 1949, p. 79.)

This same report sums up the academic preparation of the teacher in three statements: (1) The prospective teacher must have a thorough knowledge of his subject and its relation to knowledge as a whole. (2) He must have mastery of the necessary tools and techniques to acquire sound knowledge of his general subject and to engage in original and creative study of the subject. (3) He should have successful experience in the kind of independent research which not always seeks new information but which may evaluate and interpret knowledge as it relates to human experience.

And now a brief word about the pattern of study for the graduate student who expects to become a teacher. Some years ago it was quite common for the student to select a major field and one or two related minor fields for his study. In some instances the courses were prescribed and the student was expected to adhere rigidly to the pattern. Today it is a common practice to organize the graduate student's program, especially at the Ph.D. level, largely on an individual basis according to his objectives, interest, and

abilities. The success of such a flexible program depends, first, upon whether the student has a clear objective and some conception of how to accomplish it, and second, upon the wisdom and patience of his faculty adviser or advisers.

Such a plan seems to me to be the better one to follow in preparing teachers of pharmaceutical chemistry. From the varied resources of a great university or college—and no other should undertake graduate instruction to prepare teachers—the student and his advisers may select those courses in chemistry, physics, biology, and perhaps other fields that will help him to become a creative scholar who has a broad perspective of his field and an understanding of its relationships to the profession of pharmacy and to a very complex civilization.

What preparation should be provided for the prospective teacher of pharmaceutical chemistry with respect to pedagogical competence? In my judgment it should include some study of educational psychology and its applications to teaching. It should deal also with methods of teaching in higher education, including educational measurements, which might well take the form of a seminar conducted jointly by subject matter specialists and educationists. Some supervised experience in teaching chemistry to college students would constitute a most valuable asset. A course on the nature, purpose, organization, and administration of pharmaceutical education would also be useful for the prospective teacher. The work in pedagogical subjects need not extend over more than eight or ten semester hours of credit. It should not be difficult to include such an amount in the program.

Teaching under supervision should be organized to afford experience with the various types of teaching activity. Many graduate students hold fellowships and assistantships for which they render certain services, but generally these services are not sufficiently varied nor significant enough to provide the experience which the prospective teacher should obtain. Furthermore, the supervision is often not sufficient to assure the best results. Appointments to these places are not customarily made to help train the students

who are preparing to teach, but rather to supply needed staff for undergraduate teaching or to provide financial aid to students.

I would suggest that graduate schools which train teachers of pharmaceutical chemistry should use their resources, fellowships, and assistantships to provide substantial experience in teaching for students who expect to become teachers.

Lastly, we ask, what can be done to improve those personal traits and characteristics of graduate students which make for success in teaching? This question is difficult to answer, and few have attempted it. Certainly the pedagogical courses offer some opportunity to bring to the attention of students those personal qualities that improve one's probability to make good in teaching and those that limit his chances for success. Individual counseling by faculty members can also be helpful to students. Graduate schools are not likely to offer many special opportunities for personality development, but students can be encouraged to take such as may be available, even though they may be outside the usual academic program. Certainly prospective teachers would profit from frequent exercise in public speaking.

It need scarcely be said that graduate students with personality traits that are a serious handicap to successful teaching should be discouraged from entering this particular occupation.

In conclusion may I point out that the progress of the pharmaceutical profession depends very largely upon its teachers? The creative work of great teachers is essential to this as to all other professions. They are its embodiment; they represent its aims and motives, its knowledge and skill. In general, they are looked to as symbolizing the best the profession has to offer; they are chosen to set forth to young people the things for which it stands. Through the teachers the future practitioners have their first intimate and extensive contact with the profession. The teachers determine what these young men and women will learn, what professional attitudes they will develop, what ideals of service they will espouse.

The position which the teachers of a profession hold suggests that no effort should be spared in recruiting the right persons and making them fully competent for their important work.

## A Century of Research in Pharmaceutical Chemistry in the Schools of Pharmacy of the United States\*

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The request by our chairman for a paper on this subject was naively accepted by me without giving the matter too much thought. During the course of more than forty years experience in the field, it has been my privilege to collect considerable data from which to draw upon for an adequate presentation, but the exact implications of the title were not clear until later. When one analyzes the situation in the light of exact wording, it is plainly evident that the task of condensing the subject into a few minutes is next to impossible. In the first place, the phrase "pharmaceutical chemistry", which is glibly used by many others but is entirely outside the range of my own vocabulary, can only mean the chemistry of pharmaceutical substances and, therefore, chiefly of materials used in medicine and pharmacy. Such an interpretation infers dealing with the pertinent facts in all revisions of the dispensatory, beginning with the ninth in 1851. In addition it would involve all chemistry of these substances that would not be discussed in the dispensatory. Consider the enormous amount of data that might be found on such substances as sodium hydroxide and gelatin, to mention only two of the thousands possible. In the second place, the words "a century of" infer a history of something, in this case pharmaceutical chemistry; but in this history does one consider every phase, such as properties, preparation, industrial and other applications, research, etc.? Furthermore, if one is confined to one phase, does he consider only those matters that are of interest to the industrial pharmacist, to the hospital technician, to the student, to the detail man, or to others? You can readily deduce that answers to those questions carry considerable significance.

In view of the circumstances, the writer decided to exercise his prerogative of delimiting the discussion in his own way. Since this conference is entirely for teachers of chemistry in schools of

\*Read before the Section on Chemistry of the Conference of Teachers at the 1952 meeting in Philadelphia.

pharmacy, it seemed natural to confine our remarks to the academic operation of these schools. Also, it appeared wise to consider only the research phase of pharmaceutical chemistry. To my mind, any teacher of chemistry is of greatly increased efficiency in the field if he is continuously involved, either personally or in a supervisory capacity, in some piece of research, and it is to be presumed that each one of us is at present so involved. Therefore, the title of this paper has been changed to "A Century of Research in Pharmaceutical Chemistry in the Schools of Pharmacy of the United States."

At the time of organization of the American Pharmaceutical Association in 1852, research work in chemistry in this country was practically in its infancy. It is true that there were a few enthusiastic chemists who conducted investigational work more or less as a side line and that the coming of Priestley from England in 1793 greatly stimulated interest in the subject. The results of any research were mostly published in foreign journals, although *The American Journal of Science*, the *American Journal of Pharmacy*, and the medical periodicals furnished some outlet for the reports. Many of the well known colleges had been instituted years previously, but the instruction was by lecture only and chiefly in subjects such as languages, philosophy, and mathematics. Some of the educational institutions endeavored to teach natural science, chemistry, physics, and geology but without any actual laboratory practice. Scientific schools had been established at Rensselaer (1824) and more recently at Yale (1846) and Harvard (1847), but no notable investigational reports had yet been made. The early work that had been performed is partly described by Edgar F. Smith in "Chemistry in America" published in 1914. A perusal of the titles of these earlier papers shows that they dealt with general, inorganic, analytical, and agricultural chemistry. Most of the investigators had been trained in Europe and in those days it was practically impossible to get adequate instruction along research lines in this country. It is also interesting to note that the American Chemical Society was organized some twenty-five years later (1876) at the building of the New York College of Pharmacy, that its journal was founded in 1879, and that the American Chemical Journal of Remsen was started in the same year.



Pharmaceutical education in the United States was also only beginning. Six so-called colleges of pharmacy had been established at Philadelphia (1821), Massachusetts (1823), New York (1829), New Orleans (1838), Maryland (1840), and Cincinnati (1850). These colleges were started mainly for the purposes of setting drug standards and of protecting education of the pharmacist from control by medical schools. Indeed, the Philadelphia College was organized as a direct coup against attempts by the university to examine all pharmacists and designate the competent ones by a degree of Master of Pharmacy. As a background one should be reminded that a large share of the practicing apothecaries in 1821 were physicians and that the days of prescriptions still remained in the future. Undoubtedly the other colleges were organized in much the same way and for the same reasons. Little attempt had been made to provide instruction for students of pharmacy except at Philadelphia and Maryland, where such instruction consisted only of a short series of lectures. The main reliance was placed on the apprenticeship system. Edward Parrish had started an independent "School of Practical Pharmacy" at an apothecary shop in Philadelphia in 1843, but he had no laboratory facilities until 1870. The first laboratory instruction at the Philadelphia College of Pharmacy did not come until the same year, 1870. Instruction in pharmacy in the other colleges did not start until after the civil war of 1860-1865 and even then was slow in development.

Research along pharmaceutical lines in this country, therefore, had not been extensive in 1852. The *American Journal of Pharmacy*, the first volume of which had appeared 27 years previously in 1825 as the *Journal of the Philadelphia College of Pharmacy*, contained in each issue articles by members of the college and sometimes papers contributed by pharmacists in other sections of the country. Often these essays represented original work carried out in the shop by the professors, other members of the college, or their apprentices. Most of the subject matter up to 1852 concerned botany, dispensing, or problems of pharmacopoeial revision, but sometimes there were described interesting if not extensive investigations of a chemical nature. The college itself, however, had no laboratory in spite of the fact that lectures in chemistry had been given since 1821. Most of the important papers on chemical subjects had come from such indefatigable workers as Daniel B. Smith,

Elias Durand, George B. Wood, Wm. Procter, Jr., and W. R. Fisher, and presumably the experimental work had been performed in apothecary shops or on the kitchen stove.

During the last half of the nineteenth century there was a gradual acceleration of research work in all branches of chemistry. This increase was especially noticeable after organization of the American Chemical Society in 1876 and establishment of its journal in 1879. Perusal of the journal articles during the twenty years to 1899 shows that most of them were on inorganic, analytical, agricultural, and industrial chemistry, with occasional topics on vegetable drugs and other substances used in medicine. Another stimulus to research was the establishment of additional schools, not only along the eastern seaboard but also in the south and in the states west of the Mississippi River. The equipment of laboratories in all of such institutions, the increased training of teachers for manning them, and the great growth of industry during this period naturally combined to give a gradual yearly increase of output in research. The best evidence of this increase lies in the growth in size of the journal from about 200 pages of papers in 1879 to nearly 1000 pages in 1899, only twenty years later.

The influence of this growth was also felt in pharmaceutical circles although not to the same degree. From the six so-called colleges of 1850, there gradually appeared during the next fifty years a total of more than sixty institutions whose primary function was the teaching of pharmacy. Practically all of them were equipped with laboratories that were more or less adequate for instruction even if not sufficient for research purposes. Many of these schools were later discontinued or consolidated with others, but in 1899 there existed 38 schools of pharmacy that have endured from that time to the present; and these schools were in 26 states and the District of Columbia. Parenthetically, it is interesting to note that 38 more schools have been added since 1899 in 17 more states, Puerto Rico, and the Philippines, and thus in all of the states except five,—Delaware, Maine, Nevada, New Hampshire, and Vermont. The teachers that were necessary for this rapid expansion were not easy to find, and it must be admitted that few were trained to give adequate instruction and yet fewer were equipped to direct or conduct research. In 1899 the great majority of teachers of chemistry in schools of pharmacy had no

more than two years of collegiate education, and those teachers who had studied further were trained in Europe. As a further obstacle to research work in this group, there was a great tendency, even more so than there is today, to overload the instructors with teaching duties and to allow little time for investigation. Under the circumstances it is remarkable that research reports from the pharmacy schools were at all available. Nevertheless, there appeared more and more papers on chemical subjects, at first probably produced in the drugstore, later as laboratory equipment became more common, emanating from the college itself. Also, it might be noted that research reports coming from laboratories of pharmaceutical industry were meager in the early days and not much more voluminous in 1899, although at that time many such concerns were flourishing and most of them had control chemists of some sort.

The American Pharmaceutical Association must have had some influence in fostering research during this period even though one might have considerable difficulty in evaluating its amount. The organization was no more than a few years old before some one conceived the idea that it would be to the credit of the association if the executive committee issued a list of questions, or "queries" as they were called, and urged some individual to accept the task of answering each by appropriate investigation. For years after this suggestion, the committee did issue such queries at each annual convention, and for each query some one did attempt to bring in an answer the following year. From a study of the lists that were made, the names of those accepting the assignment, and the membership rolls, one comes to the conclusion that nearly all of the members took part in this really excellent attempt to stimulate research. The writer is inclined to speculate on what would be the effect on our total scientific knowledge if the thousands of national members today were each to apply himself earnestly to answering some such problem. Apparently this same system of queries was much used in the eighties in all state associations.

However, there was evident at least some sharp criticism of this query system, especially from those who were most adequately trained. One sees indications of the criticism in many of the papers and discussions at each convention and could not avoid expecting an explosion of objection sooner or later. This awaited outburst came at the convention in 1892 from Dr. Edward Kremers who

had received his education at Goettingen chiefly under Otto Wallach. Excerpts are quoted from his address to indicate to you the criticisms:

"The very existence of the customary queries is a confession of the poverty of thought and of observation in the ranks of the pharmaceutical profession. A pharmacist with but limited power of observation, and with moderate independence of thought, ought to stumble over some problem during the year which not only attracts his attention but to the solution of which he may add something. The pharmacist who must be confronted with a query in order to test a commercial article for impurities is like the quasi-scientist who scans page after page of hand-books to find hap-hazard suggestions for an investigation. A true student will have his mind brim-full with problems. The question with him is not to find a query, but, which of these numerous problems am I competent to solve, and which problem is more important at the present moment?

"However, let it be granted that queries are a necessary evil to aid others in thinking—what can be said about the character of the same? In most cases they are like the queries of the question box. Some person has stumbled over a difficulty, real or apparent. He does not possess the intelligence or push to apply his thought, but finds it easier to frame his difficulty in the words of a query in order that some other person may answer the same. This repeats itself again and again until the question-box is filled. It is then opened, and slip after slip is taken out blindfolded as it were, and every person is given an opportunity to answer as many or as few queries as his convenience will permit . . . Such a procedure is not only a confession of poverty of mental activity, but it fosters negligence and nonchalance of thought. That now and then considerable time and thought are given to the formulation of queries by individual members of committees I have no doubt, but even such well-meant efforts are often ill spent. It is no longer considered a disgrace to be ignorant of details on many, if not of most subjects. We do not expect the teacher of history to know every historical date or event, nor the mathematician to solve every problem. We do, however, expect from every teacher that he knows what he is talking about, or what questions he asks. If, therefore, a committee is appointed to formulate a set of queries, these queries should be real questions not already answered, also questions that are answerable. Let me demonstrate this by a practical example."

Dr. Kremers then proceeds to show that one recent query could be answered in five minutes by reference to standard texts and that another could not be solved even after years of constant experimentation.

The writer certainly agrees with Dr. Kremers in principle, but yet thinks that queries if real and answerable are a great stimulus

to research. It is true that many of the questions were devised without too much thought and that many of the answering papers were shallow and inept, but on the whole it would appear that a great many persons were stimulated to do some original work, perhaps to begin a life of worthwhile research. Those who, because of poor training or incapacity, were unable to give satisfactory answers at least pointed the way to further research by competent individuals.

One would be remiss in a chronicle of the nineteenth century without noting some of the competent individuals who laid the groundwork for later research. It would be impossible in this short period to take note of all papers that were submitted during the years 1852 to 1900, even of the ones that were real contributions. That the infant industries in these times took a real interest in matters of importance to pharmacists, is shown through continuous and active participation by such leaders as Frederick Stearns, Edward R. Squibb, William S. Merrill, and Louis Dohme. Papers also came from Edgar L. Patch, Alfred M. Todd, H. K. Mulford, and Henry P. Hynson. But the bulk of the contributions, as has always been the case, came from members of the colleges in the early days and from faculties and students later.

For the first two decades in this period, most of the important papers came from five of the six colleges, the most active of which were Philadelphia and New York. The college in New Orleans, which had been organized at Tulane University in 1838, did not function as such and was finally discontinued altogether. From Philadelphia the names most often heard were William Procter, Jr., Edward Parrish, and John M. Maisch, all three of whom made contributions in chemistry although they also were interested in practical pharmacy and materia medica. Dr. Edward S. Squibb presented the most papers from the New York area, but Ferdinand F. Mayer, H. A. Tilden, and several others were fairly regular contributors. In Cincinnati, Edward S. Wayne, W. J. M. Gordon, and William S. Merrill were the most active; in Boston, Charles T. Carney and Henry Thayer; and in Baltimore, A. P. Sharp and I. J. Grahame. In the meantime, five other colleges were established at Chicago (1859), St. Louis (1865), University of Michigan (1867), Howard University in Washington, D.C. (1868), and Louisville (1870). Papers were read at the conventions by Edwin O. Gale

and Albert E. Ebert of Chicago, James O'Gallagher of St. Louis, Frederick Stearns of Detroit, Albert B. Prescott of Ann Arbor, and C. Louis Diehl of Kentucky. A great majority of all contributions to the American Pharmaceutical Association during this period were answers to queries and seldom were important or showed evidence of any considerable amount of investigational work. Some of the remainder were, however, very creditable, such as the paper by A. B. Prescott on "Sulphophenic Acid" presented in 1871.

During the last thirty years of the nineteenth century, there began the groundwork for important centers of specialized research. John Uri Lloyd, who began as a teacher and practical pharmacist in Cincinnati, started his long series of investigations in phytochemistry that finally culminated in the establishment of Lloyd Brothers, a manufacturing firm for eclectic remedies in Cincinnati. Frederick Belding Power completed his study of podophyllum under Flückiger at Strassburg and reported a portion of his work to the convention of 1876. Later he instituted an important research nucleus at the University of Wisconsin, so ably continued by Edward Kremers, and a similar one under his own direction at the Wellcome Research Institute in London. The investigations by Dr. Power and his colleagues in London were frequently first communicated to the American Pharmaceutical Association in preference to the English societies. In Michigan, Albert B. Prescott was performing some excellent research in analytical chemistry, which ultimately brought to him international fame as an authority in the field, and no less brilliant was Julius O. Schlotterbeck in studies on alkaloids. In Chicago, W. A. Puckner had begun an excellent series of investigations on drug assay while professor of chemistry at the college, and continued his work by directing the chemical laboratory of the American Medical Association for twenty-five years while also acting as secretary of the Council on Pharmacy and Chemistry. Joseph P. Remington of Philadelphia, after some work with the E. R. Squibb Co. in Brooklyn, turned his attention to problems of the United States Pharmacopoeia and for several revisions was chairman of the committee. Finally, Lucien E. Sayre, a graduate of the Philadelphia College but permanently located at the University of Kansas, contributed some excellent papers on plant chemistry. During the entire period the majority of chemical investigations were in methods of analysis and the composition of plants.



Evaluation of the situation during the period of more than fifty years since the start of the twentieth century is rendered somewhat difficult for a variety of reasons. The pharmaceutical manufacturing industry, spurred on by competitive necessity and numerous extensive discoveries both here and abroad, had installed immense laboratories for investigation and product development, and during recent years has subsidized faculties of certain colleges to work on particular projects. The federal and local governments have also assigned research work on many pertinent subjects to their own laboratories and to schools of pharmacy. Two world wars have intervened to withdraw many of the students and younger teachers, and a world-wide economic depression reduced the financial backing of a majority of our colleges. There have been established 38 more pharmacy schools in the United States and the Philippines, making a total of at least 76 operating at the present time, 68 of which are members of our association. The necessary teachers to man all of these institutions adequately have not always been available, and many schools of pharmacy have been forced to remain short-handed or import inefficiently trained individuals from other fields. The American Pharmaceutical Association in 1912 separated its proceedings and original work from world abstracts and in 1940 made the research reports easily available in the scientific edition. Finally, besides the journals that have already been mentioned, literally hundreds of other outlets have been established and utilized by workers in the pharmaceutical field. This last mentioned situation was strikingly impressed on the writer a short time ago in collecting a list of the publications from present members of our faculties; these papers were found in at least fifty different periodicals throughout the world. Furthermore, quite a number of contributions to our own journals in recent years have come from foreign sources, chiefly from Canada, Mexico, Central and South America, and India. All of these factors and others have combined to render difficult any judgment as to how we have discharged our research responsibilities and taken advantage of our opportunities.

However, a careful study would seem to indicate that there has been a steady acceleration in the number and quality of original articles of a research nature that have come from the faculties of our member colleges in the last fifty years. For a large portion of this period the writer has been privileged to read these papers

as they came off the press and has taken the opportunity to study all reports in the earlier years. We have had the inspiration of truly great leaders such as Edward Kremers, Julius O. Schlotterbeck, H. M. Gordin, A. B. Stevens, Henry V. Arny, Lucien E. Sayre, and C. B. Jordan, as well as several others who are functioning on our present rolls. It is true that the great bulk of research has been performed at only a relatively few schools and that the faculties of some institutions have never contributed at all, which means that there is decided room for improvement. Nevertheless, the quantity has gradually increased during the fifty-year period and will undoubtedly continue to do so in the future. The quality, if one is to judge by profundity, extensiveness, applicability, and lucidity, has also continued to grow.

In spite of such a glowing report and evaluation of our achievements in the past, the writer is inclined to be dissatisfied with them and to be somewhat pessimistic for the future. One of our present veteran workers recently made the public statement that he was perfectly satisfied with the progress we have made to date and felt no concern about the future prospects. With such smugness some of us cannot agree. The profession of pharmacy is an old one, our schools have operated for more than a century, and yet if we face the facts of what the faculties have accomplished in research during that period and the opportunities we have missed, there is no justification for complacency and rather more reason for concern that we have been negligent in the past and that we should not be so in the future. Confining yourself strictly to chemistry, look back in your mind on progress that has been made in synthetics, antibiotics, and hosts of other medicinal agents and answer for yourself the question, "What share have the pharmaceutical faculties had in the great discoveries of the past century? If the answer to this is realistic, the obvious subsequent questions are "Why have they not had a greater share?" and "Why have we allowed the medical profession and the chemist to monopolize the great majority of the necessary research, when the pharmaceutical profession is really in the best strategic position?" In this discussion there is no time to consider all of the points involved in these questions, but it would appear that we should all give the matter serious thought.

In conclusion, however, the writer would desire to emphasize one factor that militates against our efforts or at least does not

aid them, and that is the lack of coordination. In 1919 Dr. George Beal, then on the staff of the chemistry department of the University of Illinois but having an intense interest through his revered father, suggested that we should have a central laboratory in our profession. This was inspired by a statement from Charles H. Herty that the American Chemical Society would do well to initiate a research program in the chemistry of medicinal products. Ultimately we established the central laboratory of the American Pharmaceutical Association which has concerned itself only with problems of the National Formulary. What we need, however, is something much broader in its influence. The American Association of Colleges of Pharmacy should establish through its secretarial office, the executive committee, or the committee on research a definite program of coordination. The writer attempted to inaugurate such a program through the last named committee some few years ago without much encouragement, but he is still convinced that some agency should be devised to record publications by the faculties, to outline definite subjects that should be investigated, to encourage participation by those who have not done so before, to keep a finger on the pulse of what is occurring at all times, and to do whatever else is necessary for promoting our prestige and maintaining it on a level it should deserve. Until all the schools get on their financial feet, we perhaps should not expect too much, but it should be our goal to have all members of our faculties participating on a program of research and to promote in that program the highest standards of efficiency of which we are capable. A central agency of the sort proposed could certainly speed the attainment of that goal.

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**The Bulletin of the Ontario College of Pharmacy**, now in its second volume, is published five times a year. It records the progress of pharmaceutical education, gives the trends in pharmaceutical research, opportunities for the expansion of professional pharmaceutical services and methods of promoting better public and professional relations. An admirable publication. The editorial office is at 45 Garrard Street, East, Toronto, Ontario. The editor is Prof. H. J. Fuller, of the faculty, who was formerly on the staff of the college of pharmacy of the University of Connecticut.—R.A.L.

## The Importance of Heterocyclic Chemistry in the Teaching of Organic Pharmaceutical Chemistry\*

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There is little need to belabor the point that heterocyclic chemistry is important in the teaching of organic pharmaceutical chemistry. Quoting from the preface of a widely used textbook on heterocyclic chemistry:

"A generous third of the compounds listed in Beilstein have heterocyclic nuclei; over half of the types of compounds produced by nature have heterocyclic systems; the greater share of the drugs and medicinals and nearly all of the alkaloids contain such structures; the large majority of the colors produced by nature and by man have these nuclei as essential components."

A perusal of the present U.S.P. XIV revealed that, of all the preparations listed, approximately 25% contained heterocyclic compounds in their formulation. To teach organic chemistry to pharmacy students without the inclusion of any reference to heterocycles would be akin to running a horse race with a three-legged horse. That the heterocycles represent such a large proportion of the currently used medicinals sweeps away any objections concerning their importance. It would, under these circumstances, profit the teachers of organic pharmaceutical chemistry to devote considerable thought to the best means for their presentation.

As the situation stands today most schools do not attempt to teach a course specifically designated as "Heterocycles". The teaching of such courses has been left largely in the province of graduate faculties. Perhaps the lack of interest in the teaching of this fascinating subject to undergraduates has been the supposition that it is too advanced. Far from being a weird and highly specialized field, the chemistry of heterocyclic compounds is but a logical extension of basic organic chemistry. There is, obviously, a middle road that can be taken in the consideration of heterocycles wherein they are neither completely ignored nor where they are treated in a manner to do credit to a researcher in the field. Undoubtedly,

\*Read before the Section on Chemistry of the Conference of Teachers at the 1952 meeting in Philadelphia.

whatever is being taught with regard to heterocycles is being sandwiched in by professors of organic pharmaceutical chemistry because the average organic chemistry professor of my acquaintance feels that he has done well to cover the aliphatic and aromatic fields let alone the heterocycles. It is my firm belief that at least the basic considerations of heterocyclic chemistry should be presented to the pharmacy student toward the latter part of a one year basic organic chemistry course. Following the year of basic organic chemistry, the student is in an excellent position to take up the detailed consideration of organic medicinals in a full year course in organic pharmaceutical chemistry. Actually, the course usually termed "organic pharmaceutical chemistry" is more accurately termed "organic pharmaceutical products". A course of this type takes up a physical, chemical and sometimes pharmacological consideration of the various organic drugs in current use. Its importance should not be minimized because it is in this course that the student gains much of his underlying knowledge concerning solubilities, stabilities, incompatibilities, etc. The student who has been exposed to a basic presentation in heterocycles cannot fail to have a better perception and a keener understanding of heterocyclic drugs in the organic pharmaceutical products course.

I am afraid that I have wandered afar from the principal topic assigned to me—the importance of heterocyclic chemistry in connection with plant alkaloids—with emphasis on what the pharmacy student should know about heterocycles in this connection. Obviously, a knowledge of the chemistry of nitrogen heterocycles is of fundamental importance when dealing with alkaloids. It is not my contention, however, that the study of nitrogen heterocycles should be limited to those occurring in alkaloids or that these heterocyclic nuclei should be held in any particular reverence, important as they may be. Rather, the study of this category of compounds should be carried out in a systematic manner and as a part of the entire subject of heterocycles. The above statements, however, are not meant to imply that the important nitrogen heterocycles should not be properly emphasized because it is in some of these categories that we find a predominance of our important alkaloids.

Actually, even with a broad coverage of nitrogen heterocycles, one will find that virtually all groups covered include some representative alkaloid. For example, the following list of important

nitrogen heterocycle categories together with an example of each gives some idea of the widespread nature of the alkaloids:

1. Pyrrole and Condensed Pyrrole Group—Physostigmine, Ergot alkaloids.
2. Pyridine Group—Nicotine.
3. Piperidine Group—Atropine, Arecoline.
4. Quinoline Group—Quinine, Quinidine.
5. Isoquinoline Group—Morphine, Papaverine.
6. Imidazole Group—Histamine, Pilocarpine.
7. Purine Group—Caffeine, Nucleic Acids.

Other subdivisions of the alkaloids could be named but these will suffice to illustrate the distribution in the various groups.

What then should the subject matter consist of if we are to teach about these nitrogen heterocycles that are so important? Obviously, there are many similarities between the chemistry of the heterocyclic compounds and the chemistry of the aliphatic and aromatic substances. Nevertheless, there are those properties of the heterocyclic systems that are unique to them and not possessed by the others. It is well to be sure in our minds that when we speak of teaching heterocyclic chemistry we are not merely thinking of the last student who failed to recognize the basicity of the alkaloids! Basicity, as we know, is common to both aliphatic and aromatic amines as well as to the nitrogen containing heterocycles. On the other hand, the differences in basicity of certain of the nitrogen heterocycles is, in my mind, one of the kinds of knowledge that we should try to impart. For example, when comparing pyrrole and pyridine, the average student will guess that both are basic and that they will form salts. That he has never heard of pyrrole hydrochloride does not bother him in the least because he is aware of the tremendous amount of chemical literature he has barely peeked into. However, by discussing with him the electron arrangement in the two rings and presenting him with the current ideas on "aromaticity" he could more than likely predict that pyrrole will have acidic rather than basic character and that pyridine will be basic. Aside from the basicities of the various structures there are considerations of ring synthesis, substitution reactions, ring cleavage, etc. Here again, it is my belief that the presentation should be very fundamental in nature. For example, in the substitution reactions of pyridine one can more or less predict the substitution reactions by regarding the azomethine group ( $-\text{N}=\text{CH}-$ ) as an anil group

with a tendency toward polarization of the double bond. This impoverishes the 2, 4 and 6 positions of pyridine from an electron standpoint, making the 3 and 5 positions relatively richer in electrons. Therefore, substitution by electrophilic reagents will occur at the 3 and 5 positions preferentially. Pursuing this further we note differences in the ease of substitution with certain of the electrophilic reagents. For example, the bromination of pyridine proceeds quite readily, whereas sulfonation is considerably more difficult. The reason becomes apparent when it is observed that bromination takes place with pyridine as such, but that in the case of sulfonation we are dealing with the salt in which case the ring is relatively poorer in electrons.

In closing it is my hope that the problem of teaching heterocycles to our pharmacy undergraduates will be recognized and that either with or without the title "Heterocycles" the material will be taught.

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## The Importance of Heterocyclic Chemistry in the Teaching of Organic Pharmaceutical Chemistry\*

J. H. BURCKHALTER

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The topic assigned to three of us on the program is entitled "The Importance of Heterocyclic Chemistry in the Teaching of Organic Pharmaceutical Chemistry", and I am expected to restrict my comments to the fields of local anesthetics, sulfa drugs and antihistaminics. The easiest thing for me to do would be to approve of a thorough grounding of the student in heterocycles as a necessity for proper understanding of these three divisions of pharmaceutical products. This undoubtedly would be a popular stand to take. I might even try to become oratorical in an attempt to win your com-

\*Read before the Section on Chemistry of the Conference of Teachers at the 1952 meeting in Philadelphia.



plete agreement. However, I do not feel that either oratory or a popularity contest has a place in a teachers' seminar. Rather we should attempt to face our problems in a practical and objective manner.

While it is obvious that heterocyclic chemistry is important in the teaching of organic medicinal chemistry, my experience in teaching the chemistry of synthetic local anesthetics, sulfa drugs and antihistaminics indicates that neglect of this background does not cause irreparable damage, and it does not present for me a major problem. On the other hand, inadequate understanding by the student of the chemistry of the basic esters, the sulfonamides and the benzylarylamines does cause me considerable anguish. (Specifically, I have found, for example, that students lack the ability to predict the solubility of agents based upon functional group or structural considerations.) With a proper understanding by the student of the chemistry of aliphatic, aromatic and carbocyclic compounds, I attempt primarily to stress the similarities rather than differences between them and the heterocycles. Then the effect upon the properties of a compound by its transformation into a heterocycle is examined. Finally, the nomenclature of heterocyclics is emphasized.

I should like to make more specific points by separate reference to the synthetic local anesthetics, sulfa drugs and antihistaminics.

Since Dr. Soine has had the privilege of discussing the naturally occurring local anesthetics under the heading of alkaloids, my discussion will be largely restricted to the synthetics. At any rate, the greater usefulness of the synthetics is now well established, and with the omission of the natural alkaloids, the value of heterocyclics to the field of local anesthetics becomes much smaller. One can, of course, trace the modification of cocaine through  $\alpha$ - and B-eucaine and into the non-heterocyclic local anesthetics, but in so doing it becomes apparent that there is no essential difference in chemical and pharmacological properties between saturated aliphatic and saturated heterocyclic amines.

I am reminded that dibucaine (Nupercaine) possesses the quinoline ring, and is therefore a heterocycle to be reckoned with. Although the teacher might outline the lengthy synthesis of dibucaine starting with isatin, I consider it more reasonable to leave such material for a graduate course. With the limited time at hand, I merely stress the fact that the drug fits the general structural

pattern of amide local anesthetics, and that it does contain a quino-line ring which presumably serves the usual purpose of a large space-occupying or blocking group.

Although piperocaine (Metycaine) and dipherodon (Diothane) are heterocyclic because of the piperidine ring, they are first amines and then heterocycles. It is a well established fact in medicinal chemistry that replacement of a terminal piperidyl group by a diethylamino group will always give an agent of essentially identical chemical properties and very similar pharmacological properties. That one compound holds a heterocyclic amino and the other an aliphatic amino is of minor consequence. Particularly, in the study of local anesthetics I purposely avoid undue reference to these compounds as heterocycles, except in a narrow definitive sense, in order to place the emphasis where it belongs, and I feel it belongs in the similarity to the aliphatics in synthesis, physical properties and pharmacological activity.

Some students are known to develop a phobia against certain courses or topics. For example, there is the well known phobia toward chemistry, the more specialized one toward organic chemistry and even the highly specialized one toward heterocyclics. I believe that an excellent method of teaching heterocyclics, as well as of overcoming the phobia, is to avoid reference to the term heterocycle until the similarity of heterocyclics to non-heterocyclics has been firmly established. This can be demonstrated well in the field of local anesthetics by illustrating how an opening up of the rings in cocaine can be made to yield procaine-like compounds, which are simply basic esters.

Sulfa drugs are often cited as agents which illustrate the great impact of heterocyclics upon modern drugs. While this is true, paradoxically, it might be said that for undergraduate students the heterocyclic nature of sulfas may be relegated to a position of secondary importance. Sulfanilamides are synthesized by the one procedure which involves as the first step the condensation between p-acetamidobenzenesulfonyl chloride and amines of formula  $RNH_2$ . R is simply hydrogen when the drug is sulfanilamide. When R is heterocyclic the reaction is still the same, and it is my opinion that lengthy discourse into the synthesis of heterocyclic intermediates of the type  $RNH_2$  is unwise at the undergraduate level. I am pleased when my students are able to illustrate clearly the general

activity of the sulfonamides.

It is of interest to note that among the five sulfones most often preparative methods, to understand general solubility and stability considerations and to know the nature of R which influences the cited because of their value in leprosy and experimental tuberculosis only one, Promizole, contains a heterocyclic grouping.

One widely used text logically treats the topic of antihistamines under the heading of amines rather than in the chapters on heterocyclics, presumably because all these agents are amines although almost all are heterocyclics. One might consider the fact that Antergan and Neoantergan, the former a carbocyclic and the latter a heterocyclic, may be synthesized by the same general procedure, which suggests that chemically the two drugs are very similar. Further, both agents possess qualitatively identical physical and pharmacological properties.

I have come with reluctance to these conclusions regarding the proper place of heterocyclic chemistry in the teaching of organic pharmaceutical chemistry, because most of my research activity has been in the heterocyclic field. Despite my great enthusiasm for this area of work and study, I cannot justify taking undergraduates more thoroughly than I have indicated into the subject, particularly under the heading of local anesthetics, sulfa drugs and antihistamines. If I were to do so, it would be at the expense of material which is perhaps more important.

In conclusion, while the importance of heterocyclic chemistry in the teaching of organic pharmaceutical chemistry may perhaps not be questioned when it relates to alkaloids, vitamins, amino acids, barbiturates, hydantoins, xanthines, etc., an equal stress of heterocyclic chemistry in the fields of synthetic local anesthetics, sulfa drugs and antihistamines may not be warranted at the present stage of developments in these areas. Further, it has been pointed out that, although an agent happens to be classed as a heterocyclic, this fact may not always influence qualitatively its chemical and biological properties. Also, while admitting that a thorough background in heterocyclic chemistry should be provided graduate students in pharmaceutical chemistry, perhaps less justification can be made for its great stress at the undergraduate level, particularly if it must be done at the expense of other basic organic chemistry.

## **Increasing Efficiency in Pedagogy—The Primary Objective of the Section on Pharmacy of the Conference of Teachers\***

**ROY C. DARLINGTON**  
Howard University

As we convene at this 27th Annual Meeting of the Conference of Teachers we can be proud of the progress made by the profession of pharmacy since the first formal session of this conference was held in 1925. Looking at the program that the Program Committee has prepared, I am sure that we can also be proud of the progress made by this Section in its conduction and in the formulation of its programs. Much of this progress has been made in the last ten years. When it is recalled that until 1942 the central theme of each program was formalized from year to year and that until 1943 an entire new set of officers was elected each year, this progress is readily apparent. I am certain that it is the consensus of this Conference that this progress must be continued.

It is the responsibility of the chairman to present his observations, suggestions, or recommendations for consideration by the members of this Section. It is his further responsibility, if possible, to make that presentation within the allotted time. For this reason and because I am sure that you are anxious to hear the papers scheduled and to participate in the discussions, my remarks will be brief. My remarks pertain to a method for attaining the primary objective of this Conference, i.e., increasing efficiency in the art of teaching.

In Article II of the By-Laws which regulate the practices and procedures of the Conference of Teachers of the American Association of Colleges of Pharmacy, it is stated that this conference

1. To provide opportunities among its members for the exchange of information, ideas, and techniques in the field of pharmaceutical education.
2. To study the courses in pharmacy offered in the member colleges of the Association for the purpose of constructive criticism.
3. To encourage research in pharmaceutical education.

\*The Chairman's Address—Read before the Section on Pharmacy of the Conference of Teachers at the 1952 meeting in Philadelphia.

4. To make recommendations to the Association in matters which affect the teaching of pharmacy or any branch thereof in the member colleges.

5. To encourage in the broadest and most liberal manner the advancement of the teaching methods of pharmacy in all its branches; the improvement of the qualifications and usefulness of teachers of pharmacy through development of high standards of professional ethics and education; and by its professional contacts, reports, discussions, papers, and meetings maintain pharmaceutical education at a high level.

The parent organization has hereby provided the members of this Section with an invaluable set of criteria for use in the formulation of its programs. These objectives serve as a guide to individual members in the preparation of papers and they are the means by which the Program Committees evaluate papers submitted for presentation here. These objectives also offer to the Section an excellent method for self-examination.

As a member of this Section I have examined the literature of the profession, giving special attention to the literature that has emanated from this Section. The criterion used in evaluating each publication was the following question. Does the content contribute to the accomplishment of one or more of the objectives of this Conference? This examination revealed that many papers have been presented and published on the methods and procedures used at various institutions in the teaching of pharmacy courses. The contents of courses have been discussed and constructively criticized many times. There have been exchanges of ideas and techniques that have been beneficial to all of us. There was a paucity of papers dealing with pedagogy. The result of this self-examination showed clearly that we have made great progress toward the attainment of all of our objectives except the one relating to improvement in teaching methods.

This fact is a challenge, not only to this Conference, but also to the profession of pharmacy. I am confident that this challenge will be met by those responsible for education in pharmacy. It is generally known that the problem of increasing efficiency in the science of instruction does not apply alone to pharmacy, but that it has general application to education at the university level. For documentation, we need but recall the following quotation from the Report of the President's Commission on Higher Education.

**"College teaching is the only major learned profession for which there does not exist a well-defined program of preparation directed toward developing the skills which it is essential for the practitioner to possess."**

The findings of The Pharmaceutical Survey verify the application of the above quotation to the profession of pharmacy. Among these findings was the need for steps to be taken, *in the immediate future*, to improve instruction in the colleges of pharmacy. In fact, it was stated that any considerable improvement in the four-year program would have to come principally through greater efficiency in teaching. Furthermore, when it is recalled that a large majority of the future teachers of the profession are being trained and will continue to be trained in our pharmacy colleges, it becomes obvious that increasing efficiency in pedagogy is and should be the primary objective of the AACP and of this Section.

All will agree that the annual Teachers' Seminar is an effective means of improving instruction. When it is considered, however, that the seminar for each major area of pharmacy can meet only once in four or five years, it is manifest that supplementary procedures are needed if a practicable increase in the efficiency of teaching is to be accomplished within a reasonable time. This Section, composed of those who teach the courses that are the backbone of the curriculum, is capable of initiating the action indicated by The Pharmaceutical Survey Committee.

If the programs of this Section are to make the necessary contribution to the improvement of teaching methods, a prerequisite is that papers, having direct and fitting applicability to the methodology and psychology of teaching, must be presented and published. A requisite to this contribution is that there must be ample time for the members of this Conference to exchange ideas concerning these papers. It is the opinion of the Chairman that the reading of papers without an opportunity for questions and discussion defeats the purpose for which the Conference was created.

Since it would be injudicious to eliminate the many worthwhile papers that do not deal with the mechanics of teaching, it is apparent that additional time is needed if the primary objective of this Section is to be attained. I, therefore, offer for consideration by this Conference the following recommendation:

*Recommended:*

That the Section on Pharmacy of the Conference of Teachers, in the future, schedule an additional session, wherein papers dealing with pedagogy as it relates to pharmacy, may be presented and discussed.

In conclusion I wish to express my grateful appreciation to our very capable Secretary-Treasurer, Dr. H. O. Thompson; his co-operation and able assistance during the past year have made my tenure in office very pleasant indeed. I sincerely thank the members of the Conference who have agreed to accept appointment to the several committees. To the participants in this program, I am sure that I am privileged to express, not only my gratitude, but that of the Section as well. I extend heartiest congratulations and best wishes to the incoming chairman, Dr. LeRoy Keagle. Finally, I wish you to know that I am not unmindful of the honor that you have bestowed upon me in electing me as your chairman.

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## Introductory Physiology in the Pharmacy Curriculum

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The American Council on Education, through The Pharmaceutical Survey, has recommended two courses in physiology for the pharmacy curriculum. The first, or introductory, course is to include mammalian anatomy and histology. It is my belief that anyone who has tried to teach physiology and pharmacology in a pharmacy school will be unreservedly in agreement with the recommendations of the committee regarding the inclusion of such an introductory course in the curriculum.

In the past, few pharmacy schools have made an attempt to fill the broad gap existing between the general biology courses and human physiology. If the pharmacy student has had the time or the inclination to take more than one course in general biology or



zoology, this extra work has usually been supplied by the general college courses and by teachers not trained in physiology or pharmacology. No special effort has been made to orient the subject material of such courses toward the special needs of the pharmacy student. The result has been that our students have come into physiology with a totally inadequate background for the subject. The physiology course is necessarily diluted, usually with the unfortunate result that the quality of the pharmacology is in turn lowered to a level which is, by actual worthy standards, less than mediocre.

It will be necessary for the pharmacy schools to supply their own courses in preparation for physiology and pharmacology, if these subjects are to be administered on a plane which a professional degree merits. Much of what is taught in the average zoology course, although not worthless knowledge from a cultural viewpoint, is far removed in its aims and content from either general physiology or pharmacology. On the other hand, a course in introductory physiology can present in condensed form a great deal of basic knowledge in the manner best suited for the pharmacy student to grasp and later apply in his study of physiology and pharmacology.

Pharmacy schools are compelled, because of the brevity of the pharmacy educational program to do in one course what medical, dental, and other professional schools accomplish in several large courses. The medical student approaches the study of physiology after having taken extensive courses in gross and microscopic anatomy, embryology, neural anatomy, and biochemistry, in addition to the pre-medical courses in zoology. Of course, the general aims of the medical curriculum are not the same as those of the pharmacy curriculum, and a great deal of the anatomy given to the medical student is not necessary for the study of physiology. There is, however, a certain amount of general gross anatomy and histology which is necessary for the proper study of physiology, and I should say, for the profitable study of pharmacology.

In a fundamental sense, pharmacology is a branch of applied physiology, and no program of pharmacology can be adequate if it ignores the fundamentals of physiology. If the pharmacist is to function efficiently in the capacity of professional consultant to the physician and provide in all respects a first-class pharmaceutical service, he will have to keep abreast of modern developments in

pharmacology. The busy medical practitioner cannot keep in step with the continually increasing groups of new medicinal agents. The pharmacist's professional education must not only enable him to act as adviser regarding the composition, stability, dosage forms or proper methods of dispensing, but it should also enable him to give advice regarding pharmacologic and toxicologic properties. The intelligent physician naturally wants to know the toxicity of a drug on single or repeated administration, the fate of the drug in the body, its general pharmacodynamic properties, and what it is supposed to do for his patients. The druggist should also be able to compare the action of one drug with that of related drugs in common use. Without an adequate background in physiology and pharmacology the pharmacist cannot read modern pharmaceutical literature and cannot, therefore, expect to keep up with the latest scientific developments in his own field. This is no trivial accomplishment; but it offers a challenge which we must meet if we are to survive as professional people. One able to give such information would indeed be a professional consultant to the physician, and his professional services would no doubt be in great demand. What better method of elevating pharmacy to a truly professional rank can be imagined than by improvement of the courses in pharmacology and physiology?

With the recent great advances in pharmacologic knowledge and the appearance of a myriad of extremely potent specific remedies, the teaching of pharmacology today has become a matter of grave concern to those who undertake it. Pharmacy schools must forever abandon the old system of teaching *materia medica*, as this science was called in the old days before the development of modern pharmacology. The old system is manifestly unfair both to the student and to the unsuspecting public. Knowledge of physiologic and therapeutic action of drugs depends to a great extent on animal experimentation, and pharmacology can no longer be taught properly without laboratory. These things, obviously, The Pharmaceutical Survey Committee appreciated, and no doubt they were also aware of the fact that pharmacologic techniques are mainly the techniques of physiology.

Having taught and for several years directed an introductory course in physiology similar to the one suggested in The Pharmaceutical Survey Report, I should like to discuss what I consider to

be the proper content of such a course. Gross anatomy should come at the beginning of the course. After studying the bones of the skeleton rather briefly, one should proceed to the regional anatomy and terminology referring to the different regions and body cavities. Then the individual organs and structures within the body cavities, the combinations of organs compassing the respiratory, circulatory, digestive, excretory, and reproductive systems may be considered. The course offers a special opportunity to present an array of Latin and Greek terms widely employed in scientific medical terminology. As each organ is named in English, its Latin and/or Greek equivalent is given. For example, the stomach is *gaster* or *gastr-*, the intestine is *enteron*, the lung *pulmo* or *pneumo*, the heart *cardio* or *cor*, the diaphragm *phrenos*, the large intestine is *colon*, the foot *pes* or *podium*, etc. Hundreds of important medical terms and many English words in common usage can be derived from the simple words learned in this manner by simply applying appropriate prefixes or suffixes. In fact, a rather large number of prefixes and suffixes in common scientific usage should be given as a part of the course. These can be presented at convenient and appropriate times and on examinations the students should be held for them, along with other medical and scientific terms. Practical examinations should be given over the work covered in the laboratory. The learning of medical terminology should continue throughout the introductory course and the succeeding courses in physiology and pharmacology. These courses are especially adapted to the teaching of medical terminology, and the alert teacher will not neglect the opportunity to use them to the utmost for teaching medical terms. We must have medical terms as working tools in our profession.

The course should consist of two, preferable three, lecture hours per week, and two 2-hour laboratories for one semester. The required material in gross anatomy can be presented in about six to eight weeks. The work in animal histology or microscopic anatomy needs to be as extensive as the remaining time will permit.

Material for gross anatomic dissection in the laboratory is easily obtained. Rats or rabbits may be used. Rats are easily raised and are almost as good as larger animals. A trip to the slaughter house will provide other materials suitable for gross dissection: cows' hearts with large blood vessels attached; cows' eyes and pigs' kid-

neys, lungs, liver, and brains of sheep, pigs, or other animals can be obtained with little effort and expense.

Excellent manikins and wall charts can be purchased, if there is money for them. Although they are of great aid in the teaching of anatomy, they are not absolutely essential. Such teaching aids should be utilized if available, but lack of them should not prevent the teaching of anatomy. Much can be done with preserved animal specimens and textbook illustrations.

I should like to add, however, that much time can be frittered away in anatomy by compelling the student to dissect out and learn muscles, small nerves and blood vessels. We are not, of course, teaching surgical anatomy in the pharmacy school, and a more detailed knowledge of gross anatomy is not needed for the study of physiology and pharmacology. A knowledge of the main branches of the aorta, and the large veins of the abdomen, thorax, head and limbs is sufficient for the circulatory system. The general plan of circulation with special emphasis upon the pulmonary, coronary, portal and renal circulations, the outline of the fetal circulation and changes that occur in the latter soon after birth are important. This, of course, will give an excellent opportunity to explain certain congenital defects which may result from embryologic accident or from an incomplete transition from the fetal to the adult circulation. A detailed study of muscles, nerves, and small blood vessels would waste valuable time which should be devoted to more essential things.

The animal histology should follow gross anatomy. Proper presentation of this subject will require one of the elementary animal histology texts plus a rather large collection of prepared slides. The text should be one which presents in simple and systematic form the most important morphologic and physiologic characteristics of the tissues and organs of the mammalian body. Each student should have a loan collection of slides, selected so as to follow the illustrations in the histology text. Excellent slides can be bought, but the teacher of the introductory physiology course should also learn the art of slide-making and supply a liberal assortment of slides, to illustrate the different tissues and important body organs.

There are several manuals on histologic technique, and on any college campus there are generally those, more or less expert in histologic techniques, who will gladly consult with and advise the

beginner. Each individual loan collection should contain from 50 to 100 slides. Such a collection may be loaned to one or two students. It will not be expensive if prepared by the physiology department. Slides requiring specially different techniques in preparation can be bought in smaller quantities and demonstrations set up during the laboratory sessions. For general purposes the hematoxylin and eosin-staining technique is most adaptable, and its not difficult to perform. A student assistant can soon be taught to carry out this staining technique. It demonstrates the tissues and organ structure as well as any other single technique will do. If there is not time to master other techniques for special purposes, the biological supply catalogues advertise practically any other kind of slide one would need.

Text and slide collections will serve as a foundation for histological study. The teacher may add as much general physiology in this or the preceding part of the course as time will permit. For example, after the anatomy of the kidney is studied, the teacher may profitably explain the modern theory of urine production. Also after study of the blood and lymph vessels and the structure of the capillary, the formation and movement of interstitial fluids and lymph may be conveniently discussed. An hour or more devoted to the discussion of the process of reproduction may profitably come when the ovary, the testis and accessory reproductive organs are considered.

In the first histology laboratory session the cell theory and mitosis should be considered. Even though this subject is usually studied in general biology and botany courses, I have found that many students do not properly appreciate the theory, and it is excellent orientation for the study of individual tissues which is to follow. Prepared slides of onion root tip, although not best for animal cytology, will do if more suitable ones cannot be obtained. These are easily prepared. This should be followed by a study of the elementary tissues, considering in the case of each the structure, sub-types, and location. The plan followed in most elementary texts is to begin with epithelial tissues, then follow with connective and supporting tissues, muscles, nervous tissue, blood and lymph, in about the order suggested. The student can now be given some basic physiology related to each of the individual tissues; for example, epithelial tissues are the main source of metabolic activity

in the basic constituent elements of glandular and reproductive organs; muscle tissue, specialized for contracting, provide for movement of the body and its parts; nervous tissue transmits stimuli because of its specially developed properties of irritability and conductivity. Blood and lymph distribute the products of metabolism; connective and supporting tissues bind the organs and furnish support. The bones serve as storage organs for calcium and bone marrow produces certain cellular constituents of the blood, etc.

Cursory study may be made of blood smears, and the techniques of blood counting and hemoglobin determination may be conveniently demonstrated in the laboratory. I do not approve of attempting to make experts in the performance of differentials and blood counts, as this would consume too much valuable time. Those who have special need for this kind of work can best take it in a special course. The lectures can elaborate on the physiology of blood production, the anemias and common blood dyscrasias, the constituents of blood and its coagulation, etc. The physiology of blood is extremely important, and will necessarily demand more thorough study in later courses, but to cover the fundamentals at this point will save valuable time in the succeeding courses.

The location of the organs having been learned from gross dissection, further analysis can now be offered by microscopic study. The student can now observe the kind of tissues present in each organ and form a more intelligent estimate of the particular activities which each organ performs. Before undertaking the study of individual organs, however, it is necessary for the student to acquire a full knowledge of the elementary tissues; and for each of the fundamental tissues, the subdivisions with morphologic and physiologic peculiarities must be recognized and understood, in order to make organology intelligible.

No apology is necessary for the inclusion of such a specialized type of course in the pharmacy curriculum. In all professions there are certain fundamentals which practitioners of these professions must master if they are to be expert in their respective fields. The inclusion of special courses to supply the individual needs of each educational program is necessary because of the extensive ramifications of the basic sciences. In this respect, pharmacy is no exception to other professions. As in other professional schools it is often necessary to condense much of what is required into one or

more courses and to present it especially for those who are to make professional use of it. The engineer obviously cannot take all the general calculus courses which might be necessary to get all that *he* should know about calculus; hence he takes one or more courses in engineering calculus. The sanitary engineer, for the same reason, is compelled to take a course in sanitary bacteriology; the medical student to take medical bacteriology; the dental student takes dental pharmacology, etc. The professional pharmacist must have a certain amount of basic knowledge of physiology, but he will never have the time to get a proper grounding for the study of physiology by taking all the general zoology courses necessary for this background. Introductory material, as well as much material in general physiology, will have to be condensed and presented in concrete form slanted toward our particular needs in physiology and pharmacology. The Pharmaceutical Survey Committee is to be commended for recommending an introductory physiology course to precede the regular course in human physiology. Several pharmacy schools already have two courses in physiology and no doubt others will add a second course when the physiology-pharmacology departments have gotten proper recognition of their fundamental importance in pharmacy education. The second course will be much more effective if it has been preceded by a combination anatomy-physiology course of the type herein outlined.

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## Problems Facing Teachers of Pharmacy\*

DONALD C. BRODIE

During the past few years teachers of pharmacy have undertaken a critical study of the recommendations made by The Pharmaceutical Survey Committee; they have met in the first of the AACP-sponsored summer seminars, and they have discussed at length teaching methods, course content and a number of other problems requiring attention. Since the past has only a sentimental and guiding usefulness, we may well look to the years ahead and specu-

\*A contribution from the University of California College of Pharmacy, San Francisco 22, California.



late on the problems that may appear before this group of teachers in the not too distant future. There are three problems that in my estimation will be of paramount importance in professional instruction in pharmacy.

First, the teaching of pharmacy will call for greater emphasis on scientific fact and principle. Pharmacy is an area of applied science, an area where both biological and physical principles are brought to a reality in the preparation of medicinal agents. For the most part, the fundamental principles to be applied are derived from fields ancillary to pharmacy, and not from pharmacy *per se*. The teaching of any applied field tends to become vested with skills, techniques, and traditions. These are not to be minimized in the program of any professional area such as engineering, medicine, and dentistry and neither are they to be minimized in pharmacy. But in the scientific era in which we are living, the skills and techniques and the glorious traditions of the past will not develop and perpetuate a strong profession for the future. The teaching of pharmacy in the future must be based on and developed around fundamentals and principles. The pharmacy teacher of tomorrow must be a better scientist than his predecessor of the mid-twentieth century.

Second, the teaching of pharmacy will require a greater professional consciousness and a more aggressive approach to professional problems. The future of pharmacy will be made by pharmacists, and by pharmacists alone. Until the pharmacists of the United States acquire a professional awareness and an impelling urge to serve the public welfare, the future for pharmacy is insecure. To whom will fall the responsibility for major service in preparing to meet this need? The teacher of pharmacy, although not required to do the entire job, will be faced with a major responsibility. The influence he exerts in developing professional perspectives in students will make an indelible imprint on the future of the profession. It follows, then, that the teacher of pharmacy in the future must be motivated by high professional ideals; he must believe in the future of pharmacy; and he must be motivated by a zeal and fervor that will lend to professional contagion.

The third and perhaps the most intangible factor that I wish to discuss is the ever-present problem of manpower for the future. The present trend seems to suggest that this same problem tomorrow may be even a greater problem than it is today. As an edu-

cator concerned with elevating the standards for professional instruction in pharmacy, I have been impressed particularly with the seeming lack of top-flight men in the teaching ranks of pharmacy. Can it be that the men engaged in teaching pharmacy today cannot find in pharmacy that which is both stimulating and challenging? Can it be that our teachers of pharmacy are deficient in fundamental training which teachers in other areas possess? Can it be that men who are engaged in pharmacy teaching are less capable than those engaged in other areas? Can it be that teachers of pharmacy do not have the ability to stimulate and to draw men of academic and professional caliber to follow in their footsteps? These are some of the questions for which I have been seeking an answer. It is often suggested that young men in graduate school are attracted more to pharmaceutical chemistry, pharmacology and pharmacognosy than to pharmacy. These are likewise fields of applied science stemming from the more fundamental areas of chemistry, physiology and botany, respectively, thereby having that in common with pharmacy. Why then does pharmacy fail to attract top men to its teaching ranks? Why then has the inference been made that progress in the teaching of pharmacy seemingly has lagged behind that made in the other areas of the curriculum? These are some of the problems with which teachers of pharmacy will be faced in the years ahead.

I believe that, as we, teachers of pharmacy, look to the future, every effort must be made to attract men of the highest caliber to the ranks of pharmacy teachers. I believe that deans and administrators of colleges of pharmacy who are training men for teaching positions in the area of pharmacy must examine their programs of study to determine if these men are actually receiving sound basic training in the fundamental areas. I believe that teachers of pharmacy must have training in research in keeping with the standards established by the graduate divisions of our leading colleges and universities. I believe that when instruction in pharmacy is offered in such a manner and on a plane totally acceptable to a student with scientific and professional ambitions so that it is both stimulating and challenging, many of our problems will disappear. The pharmacy teacher of the future must stand as a scientifically capable individual and must live with a deep professional consciousness and awareness that befits the needs of the profession.

## Pharmacy's Problems CAN Be Solved\*

A. N. MARTIN

Temple University School of Pharmacy

On October 7, 1852, a small group of pharmacists from various parts of the country met in Philadelphia to satisfy the needs for an organization representing the profession of pharmacy. The new society grew rapidly; its accomplishments were significant and far-reaching in relation to professional pharmacy.

However, in 1898, based on the need for an organization designed to serve the business aspect of pharmacy, a group of retail pharmacists formed a new association, now known as the National Association of Retail Druggists. To say that this division was a tragedy or even an unfortunate circumstance would be a mistake. For in pharmacy, woven of the weft of professionalism and the warp of commercialism and dyed with the varicolored tincture of manufacturing, wholesale, retail, and hospital practices, it would be unusual to expect groups with such divergent interests to remain within a single organization. It might be said that it is unfortunate all could not be collected under one parent organization, but such is only an academic problem, for each affiliate group would still have its own interests and would demand its own autonomy. It does become a serious problem, however, when these several organizations, all within the framework of one profession, cannot cooperate upon problems of mutual interest which affect the whole of American pharmacy.

The greatest of these problems which has beset the profession of pharmacy, through the years is simply stated—*unification*. Dr. E. C. Elliott, Director of The Pharmaceutical Survey, made the following statement in his report of the preliminary findings of the survey board: "Pharmacy shows a striking, even tragic, lack of unity." The many little problems which constantly plague the pharmacist and which he tries so often to solve by the expedience of legislation—these problems are merely the stooges of our Public Enemy No. 1—*Lack of Unification*. For many years some leaders of pharmacy have made an earnest plea for a united national pharmaceutical body under which each established organization could free-

\*A contribution of the Committee on Problems and Plans.

ly work, but through which all major problems affecting the profession as a whole would be channeled.

Just imagine for a moment what progress could have been made and what embarrassment avoided in regard to the prescription renewal problem if the A.Ph.A., the N.A.R.D., and the other associations representing pharmacy had been required to discuss their proposals jointly before a united pharmaceutical problem and policy board; if they had carried the fight to the F.D.A. by way of a single legal staff representing the entire pharmaceutical profession. These associations finally did compromise and come to an agreement but before the problem was solved, they were forced to "wash their dirty linen" in open view of the F.D.A. and the American public. What is still more disturbing and even shocking is that this joint effort has lead not to better relations between the A.Ph.A. and the N.A.R.D. but rather to a widening in the breach.

Steps in the direction of unified action, however, have been made. Joint meetings between the A.Ph.A. and the N.A.R.D. on the executive level have, on occasion, resulted in cooperation on certain problems. The National Drug Trade Conference has likewise served as a sounding board for controversial problems of national scope; but this is not enough. At the 1950 A.Ph.A. convention at Atlantic City, Dean Glenn L. Jenkins, in his presidential address advocated the establishment of a Commission on Pharmacy Planning to cope with the problems affecting our profession. According to President Jenkins, "... what we need is a continuing liaison body made up of representatives of all segments of the profession. The chief function of this group should be to fashion a blueprint for the understanding of intraprofessional problems, to plan for the future of the profession, and to serve as the architect and builder of a stronger American pharmacy."

#### *Action!*

But, you ask, what can I as an individual pharmacist do to bring about the establishment of such a united body? As an individual you can do little, but through your local association you can speak with force and conviction. If pharmacy is to solve its problem of unification it must begin at the grass roots—in the local associations across the country. Following are a few suggestions for promoting this unity.

First, join your local association. Parenthetically, let me warn you than when you do so, you may find that the associations in your area are split wide apart—state against county, county against city, even south-east city against north-west—shot through with petty jealousies, politics, and just plain stubbornness. You will probably realize then why it is so difficult for organizations on the national level to cooperate. Too frequently it is the fashion for pharmaceutical organizations to be constantly feuding. It is high time to reverse this attitude—make cooperation the watch-word of the day. Work within your association to resolve the differences between the factions in your own city and state. Publicize in the journals your intentions, your actions, and the results of this renewed cooperation between local groups. Include photographs of the state and city association presidents and secretaries shaking hands and pledging mutual support for a united front. Make your association the first line in this new offensive. Then interest the neighboring city and state associations in this plan.

Secondly, after coordination has been established at the local level, submit the recommendation to the national organizations through your secretary for the establishment of a National Commission on Pharmacy Problems to be maintained jointly by the various national associations and made up of representatives from all segments of the profession; a board through which all problems and activities affecting the entire profession must filter. Request that this body be nonpartisan and that it include committees on retail, education, manufacturing, hospital, and other important branches of pharmacy.

Imagine what our city, state, and national associations could accomplish if they made these steps toward unity in our profession. When is a more appropriate time to begin than now, on the eve of the second hundred years of organized American pharmacy?

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**The Pearl of Kappa Epsilon** is a well written, eighteen page brochure by Dr. Eunice R. Bownow of the University of Wisconsin, commemorating the thirtieth anniversary of the founding of the Kappa Epsilon Sorority. It covers the organization of the sorority, its objectives, its activities and its accomplishments throughout the year. A complete list

(Continued on Page 218)

## What Can We Expect of the 5-Year Program?

RAYMOND E. HOPPONEN

University of Kansas

When the five year program was proposed, it was intended to achieve several results. It was, first of all, to relieve the heavy student work load. It was to provide a broadened background in the social studies and in some of the basic science studies. It was to provide for an increased number of professional subjects. Finally, it was to result in students of greater maturity approaching the professional work of the last year or two. How successfully these results are achieved can, in the final analysis, only be determined after the program has been in operation for some time. However, it can be pointed out that without considerable thought and careful planning the five year program will accomplish little more than the present four year curriculum does.

Consider the crowding of the present four year curriculum as the primary object of attack. The usual student load now carried averages seventeen credit hours. Many students are already using five years to cover this work. If this load were reduced to fifteen semester hours by a redistribution of courses, it would be necessary to transfer sixteen hours into the fifth year. This leaves fifteen credit hours to be allotted to the second and third objectives of the five year program. The usual introductory course in the social studies carries three to five credit hours. If we allow eight to ten hours for an introduction to two fields in the social studies or for a more thorough exploration of one field, we are left with five to seven hours to be given over to basic subjects in the physical or biological sciences and to additional professional subjects. This is not sufficient to satisfy all the demands being made for time in the curriculum. If, in order to include more material in the curriculum, the credit load is not reduced, the basic purpose of the program is defeated.

What of the effect on the maturity of students? Here again, we must not expect earth shaking results. The adoption of the five year program will result in some maturing to be sure. It's bound to since the student is a year older, but more important has an additional year of experience in school. The experience and its ac-

\*A contribution of the Committee on Problems and Plans.

companying development of a greater proficiency in study and work habits will have a greater effect than will the simple aging. The Pharmaceutical Survey has shown that our entering students are the equal of those entering the arts colleges. Accordingly, they should be expected to develop as rapidly as the average college student. If they do not, it is the fault of the schools of pharmacy. Maturity is a result, not of years, but of responsibility; and student responsibility is sadly lacking in our present methods of education. There is not enough self-education on the part of the student to develop an educational responsibility. He is led too closely by the hand to develop his own abilities to find out things for himself. The question, "Are we responsible for this?" typifies the attitude that it is necessary to study only such material as is specifically designated. If these same attitudes and conditions prevail under the five year program we can expect but little increase in the maturity of our students.

It becomes apparent that if a five year program is to achieve more than a small measure of success in accomplishing its stated objectives its adoption must be accompanied by a thorough study of its content. Since in any case it is impossible to teach all that is desirable, it will be necessary to submit the entire curriculum to a careful scrutiny. Material which is unnecessary, obsolete or due to become obsolete in the near future must be culled out in order to allow inclusion of more suitable material. A conscious effort must be made to reduce duplication to a minimum. Some division may be desirable to provide the opportunity for those students interested in graduate study to prepare themselves for advanced work. Consideration must be given not only to what shall be taught but how it shall be taught. If we are to justify the adoption of a five year program, we are obligated to make every effort to insure that such a program achieves its objectives.

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of the meetings of the Grand Chapter with a roll of the officers since the beginning and a membership list of the active chapters and officers for the year 1951, the thirtieth year, are included. The activities of the professional sororities and fraternities are a part of college life and the history of pharmaceutical education and the recording of their achievements in permanent form is commendable.—Ed.



## The Pre-Pharmacy Requirement and the Graduate Program\*

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University of Maryland

The report of the chairman of the Committee on Problems and Plans, presented at the Buffalo meeting of the A.A.C.P. and published in the *American Journal of Pharmaceutical Education* (15, 578, 1951) gave a list of twenty problems facing those who are concerned with the education of the pharmaceutical personnel of this country. Several of the problems have arisen coincidentally with the deliberations on longer courses of undergraduate instruction, or combined pre-professional and professional courses. One such problem deals with the possible effects of a pre-pharmacy requirement on graduate programs in colleges of pharmacy. Another problem taken from the same list concerns the means of increasing "the supply of pharmaceutical personnel with specialized training; namely, the graduate students."

The effect of a pre-pharmacy requirement on the graduate program will in many ways determine the supply of pharmaceutical personnel with specialized training; hence these two problems should have what in many ways will be a common solution. The principal effect of a pre-pharmacy requirement on graduate programs in colleges of pharmacy will be a probable change in the number of graduates of colleges of pharmacy who undertake graduate courses leading to the specialized training which, according to the second problem, more pharmacists should possess. Both problems may be rephrased in a single statement if consideration is given to the effect of a pre-pharmacy requirement on the number of graduates of colleges of pharmacy who seek specialized training in graduate programs.

An undergraduate program, lengthened by the pre-pharmacy requirement, has the effect, if not also the objective, of standardization of the graduates of colleges of pharmacy. Such an effect is diametrically opposed to the objective of increasing the supply of personnel with specialized capacities resulting from training in graduate programs. It should be instructive to review the situa-

\*A Contribution of the Committee on Problems and Plans.

tion from this standpoint as it exists in the medical and dental professions, where specialization generally results from experience and association with experts in everyday practice rather than from further academic studies. Although figures have not been compiled in support of this conclusion, it is the consensus that very few persons with the M.D. or D.D.S. degrees undertake training in graduate schools, and a surprising number of those who do, come from foreign countries. In seeking an explanation for the low registration of M.D.'s and D.D.S.'s in graduate schools, and in predicting the effect of a pre-pharmacy requirement with or without a resulting higher degree, it is important to examine the incentive of an individual at the stage at which he would normally undertake graduate study. The altruistic desire for knowledge and increased professional capacities is probably secondary at this stage to a motivation which has a large component of pride in the realization of possessing a degree generally recognized as highest in the profession, and another component consisting of a sense of urgency with regard to economic security.

In a profession, the training required for licensure is an accepted stopping place, especially when a degree containing the word "doctor" is granted in recognition of such training. There is little incentive to undertake further training of a specialized nature, especially after a collegiate residence that is already prolonged and when a degree may be expected that may not be further flattering to an individual's ego. He is willing to accept a standardized *status quo* provided it have a popular favorable acceptance. A pre-pharmacy requirement considered in conjunction with a longer undergraduate training and its probable recognition by a more flattering degree would have a seriously adverse effect on the enrollment of professionally trained individuals in graduate schools, it would obliterate in large measure the prestige of the M.S. and Ph.D. for those individuals and would enhance the economic inhibitions attending still longer residence in college. As a result the specialized capacities for large-scale production of drug products (manufacturing pharmacy), research and development of new drugs (pharmaceutical research in its broadest sense) and instruction in many of the departments of a college of pharmacy (pharmaceutical educa-

tion) would be acquired by individuals who lack undergraduate pharmaceutical training. The situation from this standpoint is already bad, and one is constrained to inquire if it must become worse before it gets better.

There are those who will contend that the standardized product of a longer undergraduate pharmaceutical training will be more adaptable to the system of specialized training as it exists in the medical and dental professions. If the very generous concession be made that medical and dental specialists are best created without benefit of higher academic instruction, it is unlikely that the same condition will obtain as regards pharmaceutical specialists. Specialization in these other two public health professions occurs primarily at the clinical level, while the practice of pharmacy at the clinical level is daily becoming more and more standardized and the need for specialization increasingly unnecessary. On the other hand, a high order of specialization is required for the discharge of pharmaceutical responsibilities that precede the ultimate transaction that occurs between the pharmaceutical clinician and the sick person. The problems encountered by medical and dental specialists tomorrow likely will bear a considerable similarity to those encountered today, at least as far as normal ecological relations of man are concerned. Technology and methodology in these fields are not subject to as radical or revolutionary change as is necessitated by the new problems confronting pharmaceutical personnel. Specialized training is needed for pharmaceutical personnel; it should be of the fundamental, basic and adaptable type that can be acquired in academic education at the graduate level.

Graduate study is necessary for pharmaceutical personnel, and the resulting capacity for specialization in face of a changing technology is essential in a way not paralleled in the medical and dental professions. If the well-springs of the profession—the minority of pharmaceutical personnel engaged in manufacturing and control, research and development, etc.—are not cultivated and encouraged, the reservoir suffers. The majority of pharmaceutical personnel, those practicing at a clinical level, will be left with a stagnant profession, a vocation with memories of traditions and former greatness, a trade devoid of prerogative and privilege.

## The Development of Professional Morality in Pharmacy Students\*

ALLEN I. WHITE, Ph.D.

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Fraudulent and unethical practices among government employees and many other incidents of recent years have caused serious minded people to be concerned with the apparent lack of morality among people in general and particularly among those who hold responsible positions. The widespread acceptance by an attitude of indifference, or even by smiling agreement, of unethical practices is gradually undermining the character of our youth.

This problem is important to us not only as citizens, but as members of a profession in which the spread of this infection has been of long standing concern. It is not new. The A.Ph.A. has published and supported a code of ethics for pharmacy since 1852. Courses containing instruction in professional ethics have been taught in pharmacy schools for a long time. The "Findings and Recommendations of The Pharmaceutical Survey" (1948) contains the resolution, "That, the public standing and recognition of pharmacy as a profession are determined by moral character as well as by the scientific competency of its practitioners."

As teachers of pharmacy in its various branches, each of us by training and interest becomes proficient in developing "scientific competency" in pharmacy students. Too often, however, we neglect the problem of developing professional morality. This is quite understandable, but not defensible. Attempts by an individual teacher or a small group to work against the enveloping tide of immorality may appear futile and become discouraging. Yet this is the kind of job that requires individual effort and the courage and support found best in small groups.

The nature of retail pharmacy in our country together with what has been called the "American Concept of Success" frequently places a heavy strain upon the consciences of pharmacists. Pressed by a society that judges his success in terms of financial and other worldly gain, the pharmacist can easily rationalize a professionally unethical act as simple "good business". Into this neatly camouflaged

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\*A Contribution of the Committee on Problems and Plans.

trap step our "scientifically competent" graduates. But unfortunately, scientific competency will not provide them with the skill or insight to avoid this trap. The problem is a moral one. And while the school of pharmacy has been developing scientific competency in students through a well planned curriculum and through skillfully taught courses, it too frequently has left their moral development to chance. This I propose we should not do. The distinguishing characteristic of pharmacy upon which its perpetuation as a distinctive enterprise is dependent, is its professional activity. A distinguishing characteristic of professional activity has always been the ethical and moral behavior of its practitioners.

But what is professional morality? This is a difficult term to define because morality is a factor founded upon relative and changing values. It may be summed up, however, as the perfection of professional conduct that results from a perceived obligation which stems from a purposeful philosophy rather than from a set of regulations.

It occurs to me that as teachers we have available at least three different ways in which to influence students in the development of a sound professional morality.

First I would like to mention the good that can be obtained through a course in the history of pharmacy. If the course is taught with the objective in mind of having the student acquire a knowledge of the traditions and contributions of an honorable profession, it can develop, to a surprising degree, the higher ideals and concepts basic to a purposeful philosophy. When a student understands how the many related economic, political and social forces have influenced the development of pharmacy as we know it today, he appreciates more his position as a pharmacist and what he can and must do as a professional man to make his position more effective. There are other important reasons why a course in the history of pharmacy should be presented to pharmacy students and the recent article by Sonnedecker and Urdang\* points to the need of a careful evaluation of the significance of such a course by many pharmacy faculties.

Secondly, in the courses each of us teach, we can point out over and over again in a variety of ways the professional opportunities and responsibilities of pharmacists. Perhaps we are all doing this, but we may need to become more conscious of our purposes

\*G. Sonnedecker and G. Urdang, *Amer. Journ. Educ.*, **16**, 11 (1952).

for such emphasis so that not only the point of economic gain is made. Without implying that economic gain is wrong or dishonorable, one may make the point that the personal satisfaction received from a service well performed is a worthwhile reward in itself. This is in definite opposition to the point of view which asks, having only the dollar in mind, "What's in it for me?"

The third way in which teachers may exert influence on the philosophical and moral development of students is by example. Each of us has experienced differences in the impact teachers have made on him. The impact has been greatest from those teachers who have brought to the class, in addition to well organized material, an inspirational spirit.

In the matter of developing professional morality, the spirit and behavior of teachers is of far greater consequence than imparting factual knowledge. I can think of nothing more ineffective in building professional morality than a teacher who would require students to memorize the code of ethics of the American Pharmaceutical Association and then would wink at student cheating or would condone sloppy and inaccurate laboratory technique. Students are quick to note inconsistencies and become aware more quickly, and to a greater extent than we probably permit ourselves to believe, of the weaknesses in their teachers.

Character weakness in a teacher is bound to be noticed by students. The influence of the teacher who has a weak character suffers in every respect, but he is totally ineffectual in the development of professional morality. Ethical behavior is best taught, not by lecture, but by living. Therefore, in student-teacher relations, the teacher must be wise, sound and just. He must be aware that a seemingly unimportant but careless statement in the classroom may have an important effect on the students. Inconsiderate and unfair treatment of a student outside the classroom will also have its effect. A teacher needs to be ever conscious that students are developing an opinion of him. This is important not so much because it may be a matter of pride (and promotion?) for the teacher, but because it is important to the student and his development. The opinion that a student develops of a teacher may become the foundation stone in the development of the student's character.

The teacher should also be conscious of the effect his life outside the classroom may have on students. It is a common attitude

that what a teacher does off the job and how he behaves away from the school should be strictly his own business. But no one can successfully lead an ethical professional life and an immoral private one. Only one bad act is necessary to undo many good ones. Like a grain of strychnine in a pound of flour, the one immoral act destroys the effect of all the good. And the place or time of commission is of no consequence as to its effectiveness.

As teachers, then, we have an opportunity to dedicate ourselves not only to the development of "scientific competency" but also to the development of professional morality in pharmacy students. The reward that accrues to the teacher who feels that he has been a real influence in the development of the character of a student as well as of his professional skill may not be measured by the "American Concept of Success". But as teachers, we know and appreciate the true happiness it can bring.

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## Ethics for the Pharmacy Student\*

K. L. KAUFMAN  
Butler University

One of the aftermaths of World War II, as of other big wars in the past, was an increased amount of discussion of professional ethics. In the case of pharmacy, we soon found ourselves in the midst of "The Survey", a study with many ethical implications. This group recommended more thorough indoctrination of the student in the meaning and practice of professional ethics, and suggested better observance by pharmacists generally. The AACP committee on curriculum and the American Council on Pharmaceutical Education have accepted the applicable part of The Survey recommendation. We doubt that many who read this will question the need for devoting some attention to professional ethics.

Since most of us who must furnish the instruction or indoctrination in this field are not versed in the classical philosophy or the history of moral law, it seemed appropriate to offer this paper

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\*A contribution of the Problem and Plans Committee.



as a basis for discussion. The field is relatively new to us and we can benefit from an exchange of views. This paper will outline the procedures followed at Butler University. It is not suggested that it represents the only satisfactory approach, nor that it is the best approach. However, it has passed through several developmental stages to date.

Our experience suggests that there is no simple solution to the problem of teaching ethics. One may give copies of one or more codes of ethics, one may require a course (or a unit within a course) in ethics, or one may "spoon-feed" the class with special lectures and lecturers on the subject. All of these together, will not in our opinion, be adequate. For some degree of success in this field, we feel the discussion in which the students take part is the critical ingredient.

We attempt to teach and indoctrinate with a sense of ethics by making two principal attacks on the problem. These major attempts are made in the first and second years of college.

Our first effort is made when the students take the required Orientation Course in the first semester at Butler. The Orientation class carries only one semester credit. The students are told at the outset that the course has two major objectives: (1) to inform and discuss the various parts of the curriculum and the future opportunities that will be provided to the pharmacy graduate because of the nature of his studies, and (2) to introduce them to the moral obligations of a professional person.

We have been devoting three of the sixteen periods to this last subject. Briefly, the material covered is: (1) the Educational goals of Pharmacy and other professions, (2) definition of "ethics" and the difference between general ethics and professional ethics, (3) introduction to and brief analysis of some parts of the APhA Code.

The class is urged at the beginning of each period to ask questions at any time. If they do not begin spontaneously, the teacher asks them himself, although this is rarely necessary. The theme emphasized throughout this unit of work is that *professional people must have as their primary motivation, a desire to serve*. Earlier discussions on the curriculum have shown the need of an interest in, and aptitude for the sciences. It now follows that the student must have two types of personal characteristics if he is to become a

good pharmacist: special qualities of heart and special qualities of the mind. That is the final conclusion we try to emphasize. We attempt to make the point so strongly that students will change their program of study if they disagree. In fact, we encourage them to do so.

In the second year, and throughout the curriculum, teachers are urged to make reference, where appropriate, to matters relating to professional ethics. We attempt to avoid the appearance of "Preaching." It is in the sophomore year that we make our major effort at indoctrination. This work is concentrated in the class we call "History and Ethics." We use a third of the three-hour course for this purpose.

We begin the semester with history, and turn to the subject of ethics after we have discussed the contributions of ancient Greece. The material covered may be summarized as follows:

1. Reasons for switching to Ethics at this point.
  - a. Review of reasons for studying Ethics.
2. Review of the four famous ethical systems.
3. Origin of professional codes.
  - a. Meaning of "Fee Codes."
  - b. Inspiration of and need for, the Hippocratic Oath.
4. Review of the content and meaning of the Hippocratic Oath.
  - a. Influence on subsequent generations of practitioners throughout the world.
5. Mention of medieval and renaissance writers and their hedonistic viewpoints.
6. The Oath of the Faculty of Medicine at Montpellier.
7. The so-called "Oath of Maimonides."
8. Sir Thomas Percival: his background and friends.
9. "Medical Ethics" by Percival.
  - a. Review with special emphasis on the chapter on the Apothecary.
  - b. Shortcomings of the code from an ethical standpoint.
10. A.M.A. Code of 1847.
  - a. Comparison with Percival.
  - b. Brief summary of changes down to the present Code.
11. Current Code of the American Medical Association.
12. Code of 1852 of the American Pharmaceutical Association.
13. Codes of 1922 and 1952 of the American Pharmaceutical Association.
  - a. Detailed discussion with emphasis on points poorly observed.
14. The origins of some other codes.

15. Brief review of American Dental Association and American Institute of Chemists codes for comparison and re-emphasis of the meaning of professional ethics.

16. Liberation from selfishness.

a. The five stages as related by Kohn.

Note: During this work, the students must prepare a library report on some article related to professional ethics.

In the presentation of this material it is hoped that a fairly strong impression is made upon the minds of the class. The group is divided into two sections during the presentation of this unit to provide for a more free-flowing discussion.

The most successful device, which we have discovered so far might be called "sloganeering." The "catch phrase" which expresses some special truth gives an emphasis to a point that five minutes of lecture could not accomplish. These have the further virtue of being kept in mind more easily. Here are a few examples we think are effective:

"Professional Ethics vs. Market-place Ethics."

"Pharmacy is a profession in Solution, and its concentration varies from 100 percent down to 1 percent."

"The three unfailing characteristics of a profession: Education beyond the usual level, the primary duty of service to the public and the right to self-government."

"Professional Ethics is more than professional etiquette."

"Value, duty, and law are the basic concepts in Ethics."

"Professionalism can exist in any type of store."

Of course in our class presentations, the authors of these quotations are credited, not only for reasons of fairness, but because it is felt that in some instances the names will emphasize the point.

Mere ability to memorize the given material to a sufficient degree to pass a test is *not* our major objective. As in the first year group, we try to emphasize professional responsibility and the prime necessity of placing service to mankind above the desire for money. Those who disagree with ethical principles noted as necessities for professional men are warned again that it would be better for them to change their major course.

We are not unaware of certain major obstacles to the permanent success of this indoctrinational effort. The principal problems which disturb us are these:

1. Some members of each class tend to confuse questions of jurisprudence with ethics. We try to handle this problem by patient explanations, frequently repeated privately after the class.

2. Most youngsters want a "pat" answer for any situation that may come up in class discussion. This is no problem with some cases, but in others the easy and accurate answer does not exist. This is due, usually, to the lack of sufficiently detailed information on the case under discussion. We think it is easy to discourage the student when there are too many "ifs" in our answers. Therefore, we attempt to handle these situations with emphasis on the necessity to learn the facts in a situation and to remember that most things in life are neither black nor white but some shade of gray.

3. We are concerned as to whether our efforts will show results after graduation. Have we really converted our students to the type of thinking which characterizes truly professional men and women? Even if we have been reasonably successful in the classrooms, will they withstand the pressures, principally economic in nature, which they must face later? We have proceeded on the theory that we will not be 100 percent successful in either respect, but that we do contribute a "bit of leavening to the loaf" of pharmacy each year.

It is reasonable to ask by what means we seek to measure our results. We have no quantitative criteria, but the following points may be worthy of note:

1. In both the Orientation and the History and Ethics courses, the students are asked to submit a written criticism of content. Invariably, a high proportion of the replies state that more time should be given to Ethics. These comments may be submitted unsigned, the instructions to the class emphasize criticism, and not compliments, so we think they have some significance. We believe that many, perhaps most students are lacking in this area of knowledge and thought because they have had no instruction to help them, and that they can be led readily toward a higher plane of thought and action.

2. Conversations with students outside the classroom are apt to bring forth unsolicited remarks concerning ethics. This seems to happen with all teachers, and not just with the instructor in the courses mentioned. The same thing occurs frequently in various classes, notably in dispensing and jurisprudence.

3. Comments by retail pharmacists show that many students working part time have carried some ethical ideas into their places of employment. Occasionally, these retailers appear less gratified by this fact, than we are.

We welcome any comments and suggestions from other teachers.

## A New Sequence in the Pharmacy Curriculum\*

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Any teacher who has taught freshman or sophomore pharmacy has no doubt experienced the great difficulty which is encountered in discussing modern pharmaceutical preparations which, in many cases, include complex organic drug ingredients. The students at this level do not have adequate background knowledge to comprehend chemical and physical principles involved in a consideration of such products. For example, elementary pharmacy textbooks refer to such products as Benzalkonium Chloride Solution, Chlorazodin Solution, Sodium Indigotindisulfonate Injection, Benzyl Benzoate Chlorophenothane Lotion and Polyethylene Glycol Ointment. Since it is impossible to discuss the chemistry as well as the physical-chemical properties of these products with the student who has not yet had organic chemistry or advanced pharmacy, the teacher usually contents himself with "skimming the surface" or disregarding these more complex products altogether, with the hope that they may be taken up in a later course. Neither of these alternatives is satisfactory and the situation is becoming less so each year as the older and simpler galenical preparations are giving way to the organic products of modern pharmacy.

Twenty-five years ago it was not only possible but quite logical to teach the galenical preparations in the first two years, reserving the study of the then newer and more complex organic medicinals for terminal courses in pharmacy and pharmaceutical chemistry. Today the instructional emphasis should be on the organic medicinal preparations because they have become so abundant in the official and non-official texts that they can no longer be left to a hurried perusal in a terminal course.

Based upon these fundamental curriculum problems, the principles essential to an ideal sequence for the pharmacy curriculum are set forth in the following outline:

1. The student should first be given a kaleidoscopic survey of the profession of pharmacy including its history, educational structure, literature, and its problems and opportunities. This is in accord with

\*Read before the Section on Pharmacy of the Conference of Teachers of the 1952 meeting in Philadelphia.

the plan which met with general acceptance at the Pharmacy Teachers' Seminar in Wisconsin in 1949.

2. It is desirable that the student acquire a rather thorough understanding of inorganic and organic chemicals before attempting to combine these substances in the laboratory into pharmaceutical preparations. Thus, the courses in inorganic and organic chemistry should precede those in pharmaceutical products and preparations.

3. The courses in inorganic and organic pharmacy should include laboratory instruction in the preparation of typical official and non-official preparations and these products should contain some of the particular drugs under consideration in the didactic work.

4. Pitched at a sufficiently high level, a course should be offered which correlates the physical and chemical principles of the basic sciences to the preparation of pharmaceutical products. This subject, of course, should be preceded by general chemistry and physics.

5. At some point late in the curriculum, the chemistry and pharmacology as related to the pharmacy of medicinal agents should be integrated into a course, referred to by various titles, such as Chemistry and Pharmacy of Medicinal Agents, or Official and Non-Official Drugs, or Pharmaceutical Chemistry.

6. A terminal course in compounding and dispensing of prescriptions should be offered as the capstone in the pharmacy sequence.

With these several criteria in mind, it is possible to establish a curriculum in which the pharmacy courses fall into a stepwise progression from the introductory course through to the complex relations between chemical structure and therapeutic action of medicinal agents and the combination of these drugs into pharmaceutically elegant prescriptions.

With the foregoing criteria in mind, one may then develop a curriculum in which the pharmacy courses fit into a stepwise progression from the introductory to the terminal course.

**Table I. Possible Four-Year Pharmacy Curriculum**

**First Year**

General Pharmacy\*  
General Chemistry  
Biology  
Mathematics  
English  
Social Science or Humanities

**Second Year**

Inorganic Pharmaceutical Products\*  
Organic Pharmaceutical Products I\*  
Organic Chemistry  
Physics  
Physiology  
Microbiology  
Biochemistry  
Pharmaceutical Arithmetic

**Third Year**

Organic Pharmaceutical Products II\*  
Introductory Physical Pharmacy\*  
Pharmaceutical Economics  
Analytical Chemistry  
Pharmacognosy  
Pharmacology  
Electives

**Fourth Year**

Pharmaceutical Compounding and Dispensing\*  
Chemistry and Pharmacy of Medicinal Agents\*  
Pharmaceutical Administration  
Pharmaceutical Law  
Advanced Pharmacology  
Electives

**General Pharmacy.**—The courses in General Pharmacy is divided into two parts. The first semester is devoted to an introduction to the practice of pharmacy, an orientation into the college program, a description of the courses to follow, and some idea of the opportunities in pharmacy. In the second semester, the student is introduced to the study of medicinal agents, their origin, administration, and a discussion of the pharmaceutical preparations; viz., solutions, emulsions, suspensions, semisolids, and solid products. The lectures are accompanied by demonstrations and a liberal use of other audio-visual aids. The course may be purely didactic or may include laboratory instruction in the second semester. In this second part of the course, the student learns the types of products and becomes familiar with at least the simpler technics involved in their preparation through demonstration or actual laboratory instruction.

\*Those courses in Table I which are marked with asterisks are part of, or closely related to, the pharmacy sequence and are discussed in brief.



Since General Pharmacy is the only professional course given in the freshman year, a school which chooses may replace this first year *in toto* with a preprofessional year requirement, in which case the introductory pharmacy course would be given in the first professional year.

**Inorganic Pharmaceutical Products.**—After having completed the general pharmacy and general chemistry courses, the student is equipped to enter the course in inorganic drugs in the second college year. This course consists of lectures and laboratory exercises in which the student studies and prepares the various inorganic pharmaceutical preparations. As an example of the correlation between the lectures and laboratory work, the study of iodine may be cited. During the week in which the use, concentration, and pharmaceutical properties of iodine are being studied in the lecture period, the student prepares Iodine Tincture, Strong Iodine Solution, and Iodine Ointment in the laboratory. Thus, in keeping with the importance of the medicinal agents in modern pharmacy, the drugs rather than the preparations of a particular type are studied as a group. With a knowledge of the pharmacy and chemistry of drugs the student can then more intelligently prepare the products involving these materials and can discuss the reactions, incompatibilities, and properties of each preparation as it is made in the laboratory. It is felt that this type of integrated instruction is a decided advantage over the material now being taught in the courses known frequently as "Pharmaceutical Preparations" or "Operative Pharmacy." The course content of operative pharmacy is integrated into this and the succeeding course.

**Organic Pharmaceutical Products, I and II.**—Following the study of inorganic drugs and their pharmaceutical preparations, the organic products and preparations are considered in a similar manner. As may be observed in Table I, the study of organic chemistry in the four-year curriculum may be begun at the second year and by the second semester, the student should have a sufficient understanding of organic chemicals and their properties to begin a study of the simpler medicinal agents. The lecture and laboratory of the Organic Pharmaceutical Products course extends through the first semester of the third year. Although the relationship of chemical structure to pharmacological action is considered for the most part in a later course, the student's knowledge of physiology and

pharmacology can be applied to a limited extent in the discussion of organic pharmaceutical products. In the 2-3 or 2-4 program it would be possible for the student to have completed organic chemistry and a first course in pharmacology before the course in organic medicinal products is begun. No doubt, the extended curricula would bring many advantages.

As an example of the type of instruction in the course in Organic Pharmaceutical Products, consider the subject of the barbiturates: following the chemical classification of these agents and brief mention of the relation of chemical structure to onset and duration of action, the pharmacy of the individual official and non-official barbiturates and their preparations is studied. In the laboratory, Phenobarbital Elixir and capsules of barbitol may be prepared. The solubility of phenobarbital and its sodium salt is studied and the incompatibilities of the barbiturate elixirs may be investigated and corrected.

**Introductory Physical Pharmacy.**—The second semester of the third year in a four-year curriculum is devoted to a study of the principles of physics and chemistry as related to the preparations of pharmacy. Various pharmaceutical solutions are studied in the lecture room and laboratory. The pH, tonicity, color, flavor, and stability of these preparations are considered. The pharmaceutical dispersion including colloids, emulsions, and suspensions are studied and prepared. Semisolid and solid pharmaceutical preparations are also considered from the standpoint of the newer emulsion type bases, microcrystalline powders, and other modern advances in pharmacy. Again it must be observed that this course will be strengthened when an extended program is adopted. It then will probably be referred to as "Physical Pharmacy" and will be based on a foundation of calculus and physical chemistry as suggested by Busse.<sup>1</sup>

**Chemistry and Pharmacy of Medicinal Agents.**—This course may be the province of either the pharmacy, chemistry, or pharmacology department. In some schools it may be possible to carry out a cooperative program between these departments, which would undoubtedly be most beneficial for the student. The prime purpose of this course should be to relate the chemical structure to the pharmacological action and therapeutic use of medicinal products. The intent of the course is to bring together into one organized review all of the significant features of outstanding therapeutic agents. It is suggested that the organization be on the basis of a therapeutic outline so that the pharmacy graduate will be well equipped to advise the physician in an understanding manner; however, it is realized that the major

emphasis will depend upon the teaching personnel of the school.

**Compounding and Dispensing Pharmacy.**—After having thus far completed the courses in the pharmacy curriculum, the student is particularly well qualified to "tie together" all the threads of his past knowledge and experience in the capstone course of Compounding and Dispensing Pharmacy. In this course, the student prepares prescriptions of all types and carries out many of the other important duties of the practicing pharmacist. In the model pharmacy, he checks and inventories stock, prepares narcotic forms, fills unusual and difficult prescriptions, corrects incompatibilities and accumulates information on new drug specialties. The student should be capable of solving problems with a minimum of assistance from the instructor. Discussions include the handling of prescriptions, their legal aspects, and a study of new and unusual prescription combinations.

Reference cannot be made in this short paper to the role of many other important courses in relation to the pharmacy course sequence; manufacturing or hospital pharmacy are considered as required subjects in the undergraduate curriculum of some schools. Such courses have been grouped in Table I under the classification of elective courses, not because they do not warrant more importance but rather because their position and course content is not as critical and has not been as puzzling in the pharmacy curriculum as have the courses considered in this paper.

In their recent book, *The Pharmaceutical Curriculum*, Blanch and Webster<sup>2</sup> have emphasized the technology of pharmacy as exemplified in their suggested sequence: pharmaceutical preparations, physical pharmacy, pharmaceutical technology, and dispensing pharmacy. However, the present writers believe that the need in modern pharmacy practice has shifted from the technical aspect of preparation and compounding to a knowledge of the chemistry and activity of drug products. Hence, it is believed that a course is more meaningful and valuable to the student when it embodies a study of both the chemistry of the drugs and the technic of their preparation and combination. This premise has been applied in the course content and sequence as discussed in the previous paragraphs.

In conclusion, the authors believe that there is a great need for widespread adoption of a uniform curriculum in pharmacy. No program has yet been presented which has met with general acceptance. This paper is presented in order to stimulate interest in a new uniform program which it is believed would better meet the requirements of the educational program in pharmacy today.

## Stimulating Compounding Accuracy in Dispensing Pharmacy Students\*

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The teacher of dispensing pharmacy has many responsibilities, and many problems. One of his outstanding responsibilities, and also one of his most difficult problems, is the development in the student of the ability and the desire to achieve quantitative accuracy in compounding. No amount of pharmaceutical elegance, no neatly typed label, can take the place of therapeutic effectiveness when the student does not have the knowledge and ability to do accurate compounding. Likewise, no amount of knowledge and ability can take the place of the *desire* to do accurate compounding. There lies our task: Impart the knowledge; develop the ability; create the desire.

Several years ago we began to design a program with the above objectives. We realized that there were many factors to be considered, and that several years would probably be required to bring our program to even a fairly satisfactory level. We were only too right. Today we realize that we shall probably never arrive at the perfect solution to our problem, but the broad outline and many of the details have been filled in.

Our first efforts took the form of a practical laboratory examination, each student being asked to fill five typical prescriptions—a folded powder, a simple solution, a buffered isotonic ophthalmic solution, an ointment, and a suppository. Each of these prescriptions was to have been assayed, but because of practical difficulties which arose, only the first three were assayed. Our idea in giving this type of examination was to reach the student in the middle of his final semester, with an objective picture of his achievement in prescription compounding, and then to point out his deficiencies and to aid him in overcoming them. The class was not notified in advance that the prescriptions would be assayed. The results of our analyses were, frankly, disappointing. Some of our students even insisted that there must have been errors in our analytical methods; that they could not possibly have made such large

\*Read before the Section on Pharmacy of the Conference of Teachers at the 1952 meeting in Philadelphia.

errors. Goldstein, it will be noted, encountered this same attitude among practicing pharmacists whose preparations he analyzed.<sup>1</sup> We had faith in our analytical methods, but we felt that our teaching methods should be re-examined, and perhaps our testing methods as well.

The following year the subject of accuracy was emphasized much more strongly in lecture, and laboratory demonstrations also emphasized the most accurate methods of compounding. We retained the practical laboratory examination, but this time, because we wanted to determine the level of accuracy which our students *could* achieve, the class was informed in advance that its preparations would be analyzed. The results showed an improvement over the previous year's class, but left much to be desired. The point was made that by the time the student encountered the practical examination, the course was three-fourths completed, and only a few weeks were left in which to analyze his errors and to form new habits. Once again our teaching and testing methods were examined. Out of this examination came major changes which have given us the most rewarding and encouraging results yet.

In the third year of our program, a series of lectures at the beginning of the course in dispensing pharmacy was devoted to a comparative study of the accuracy or inaccuracy of typical manipulations in measuring, mixing, and transferring ingredients. Sources of error were pointed out, their magnitude defined, and suggestions for their elimination offered. Concurrently, the beginning laboratory exercises were devoted to a detailed study of instruments of measurement, particularly the prescription balance. Balances and weights were tested, to assure the students that the equipment with which they worked was capable of giving the accurate results which we desired. At the same time, the class was informed that a number of prescriptions, not previously identified, would be chosen from the regular laboratory preparations, and subjected to quantitative analysis, and that the results of the analyses would be made known and would make up a portion of the final grade in the course. Goldstein's recommended tolerances, with certain modifications for the purpose at hand, were used as the criteria for judging the acceptability of student preparations. It was emphasized that our primary purpose in making the results public was to allow the stu-

dent to compare his results with those of his classmates, and to correct his mistakes.

As the course progressed, the discussion of each class of preparations included a study of the techniques involved in attaining maximum accuracy. Students who did poorly on the first one or two analyses were encouraged to go through the manipulations slowly, and to try to spot their own errors, with our assistance. Students who showed high proficiency were recognized and encouraged to assist their less accurate classmates in improving their techniques.

I believe I am safe in saying that the program achieved a certain popularity with the students. Because they did not know in advance which prescriptions would be analyzed, a greater degree of care was given to the compounding of all prescriptions. Interest in the program was not limited to school hours. Students who worked as part-time assistants in local pharmacies tested balances and weights used in their places of employment, and, in at least a few cases, caused new weights to be purchased and old balances to be renovated. They observed inaccurate practices of some of the registered pharmacists with whom they came in contact, and discussed methods of avoiding such inaccuracies. By the time they had completed the course, they may not have been the most accurate group of pharmacists in the country, but they were certainly one of the most accuracy-conscious groups.

I would like to cite a few examples showing the degree of improvement over a period of three years. Please bear in mind that I do not offer these figures as a comparison with your own students. You may be able to do better. The important point is that succeeding classes in the same institution have shown a marked improvement as a result of conscientious effort on the part of the faculty.

A preparation consisting of three fluid ounces of a five per cent solution of potassium permanganate was assayed for all three groups of students. The tolerance recommended for this preparation by Goldstein is 12.5%.<sup>2</sup> Of the first group of preparations, only 50% fell within the tolerances, and the mean error was 23%. Sixty per cent of the second group met the requirements, with a mean error of 15%. Of the most recent group, 90% fell within the tolerances, with a mean error of 6%.



A preparation consisting of one ounce of a 5% iodine ointment produced a mean error of 18% in the second group, with 6% of the preparations falling within the tolerance limits of 17.5%.<sup>3</sup> Of the most recent group, 90% met the requirements, with a mean error of 11%.

One ounce of a one per cent silver nitrate solution gave unusually good results for the third group, with 97% of the class submitting preparations coming within the recommended tolerance of 20%. This group did not do as well on all preparations, however. Only about 75% were able to meet the requirements when an isotonic solution was analyzed for sodium chloride. We believe we have isolated the most important source of error in this preparation, and it will be corrected.

When four capsules from a prescription for twelve two-component capsules were analyzed, 70% of the class met the requirements for the average amount of active ingredient, and 75% met the requirements for average weight of the capsules.<sup>4</sup> We feel that we may have been unfair here in basing our judgment on only four capsules, rather than on the whole prescription.

While the results obtained are gratifying, I should point out that the demands of such a program on the instructor who undertakes it are high. An absolute minimum of five per cent of all the preparations compounded should be analyzed, and ten per cent would be better. Where classes are large, numerous hours of analytical work are involved. We are heartily in agreement with Goldstein in that a full-time analyst, who can carry this program into the other pharmacy courses as well, is needed, but most of our departmental budgets do not allow for such an individual, and so the burden falls on the professor and his laboratory assistants.

In choosing prescriptions to be filled by students in the laboratory, some thought must be given to their adaptability to simple assay methods, and frequently those methods must be worked out and tested by the instructor. If all students do not fill the same prescriptions, prescriptions of a comparable degree of difficulty are necessary for fair comparison. Finally, the same prescriptions must not be analyzed year after year without alteration, because the element of uncertainty is very important in stimulating the students to do their best on *all* prescriptions.



In the examples cited, an effort was made to obtain comparable results by using prescription orders which, while worded differently, resulted in theoretically identical preparations when filled. For example, the first of the three groups of students whose preparations were analyzed was asked to prepare a solution containing 4.5 Gm. of potassium permanganate and enough distilled water to make 90 cc. of solution. The second group was to prepare three fluid ounces of a 5% solution. The third group was asked to prepare 90 cc. of a solution of such strength that a certain concentration would result when the patient diluted the solution according to the directions on the label. Proper calculation led again to the preparation of a 5% solution.

Up to the present time, all analyses have been on a class-wide basis, and because of the time required for analysis on a spare-time schedule, there has been a delay in getting the results to the class. We propose, in the coming year, to do, in addition to the analysis of at least five per cent of the preparations of the entire class, frequent spot checks of eight or ten prescriptions. The names of the students whose preparations are chosen for these spot checks need not be revealed, for our purpose is to show class tendencies by random sampling. Such a plan will mean added work, naturally, but we feel that it will be justified by the results.

#### *Summary and Conclusions*

Any attempt to stimulate accuracy in compounding by students of dispensing pharmacy should continue throughout the presentation of the course. A three-point program which has given good results consists of (1) detailed instruction in the use of the measuring instruments of pharmacy, (2) constant emphasis on the most accurate methods for compounding the various types of preparations, and (3) actual quantitative analysis of student preparations followed by publication of the results. Special recognition of students achieving excellent accuracy has resulted in a wholesome spirit of competition and pride in achievement.

Practical difficulties encountered include the necessity for devoting long hours to analysis, the selection of prescriptions amenable to simple assay methods, and of equal difficulty if all students do not fill the same prescriptions, the development of assay methods, and the necessity of introducing new prescriptions or of analyzing different prescriptions each year. While these difficu-

ties are formidable, the author believes that the results obtained justify the effort expended.

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## Some Aspects of the Teaching of Pharmacology\*

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I would like to preface my discussion of the place of pharmacology in the pharmacy curriculum with a few personal remarks about my feelings on being invited to speak at this meeting.

Those feelings were, to say the least, quite mixed. On the one hand, I must admit that I welcomed the opportunity to present my views on the teaching of what I consider the most important subject in the curriculum. On the other hand, however, I must confess that the thought of speaking before a group of this stature filled me with considerable terpidation. My doubts about the propriety of discussing problems that most of you have been considering for much longer than I, were deepened by the suggestion that remarks be limited to about ten or fifteen minutes. I feared that the need to say something significant about such a broad subject as the teaching of pharmacology, in so short a time, might make me seem extremely dogmatic.

And so, I want to begin by disavowing any pretensions to knowing all the answers. The opinions I offer are not graven in stone, but represent only one man's views, as they have evolved in

\*Read before the District No. 2, Boards and Colleges at the 1953 meeting in Albany.

a relatively short teaching career. Because that process of personal evolution is still going on, I trust that the open exchange of ideas at this meeting will serve to modify some of my present opinions, and to crystallize others.

I shall limit this discussion to some statements concerning what I consider the proper objectives of a pharmacology course and the means by which these goals may best be attained. In doing so, however, I cannot avoid saying something about the relationship of the other biological sciences to pharmacology. In addition, because I expect some disagreement with my views, I shall try to anticipate some of the opposition arguments by meeting them head on in this initial presentation.

What should the pharmacology course teach, and how may such material be best presented? Before we can answer these questions, we must first determine the function of the modern pharmacist. An understanding of the changing nature of pharmacy is essential, if the teacher is to formulate a pharmacology course that will really prepare his students for the profession as it is being conducted today and as it will be practiced tomorrow.

The changing character of the pharmacist's job was first indicated by The Pharmaceutical Survey of a few years ago, and every new prescription survey points up the same basic truth—that today's pharmacist requires a minimum of manipulative techniques and an ever increasing fund of knowledge about the products he is called upon to handle. Such product knowledge is the means by which the pharmacist can gain his rightful place among the health professions as the acknowledged expert to whom the medical and dental professions and the public can turn for advice and guidance concerning all phases of drug action.

No course in the curriculum is more important than pharmacology in enabling the pharmacist to fill this role of drug specialist. A thorough understanding of the principles of pharmacology and an ability to apply them to clinical therapeutics and to communicate this knowledge to the members of the other public health professions can add immeasurably to the professional stature of the pharmacist.

Having thus defined our objective, how should we proceed to realize our goal of producing pharmacists grounded in the basic

concepts of pharmacology and able to apply them to new situations in the rapidly advancing field of drug therapy?

First, we must decide what is worth teaching—what, in the vast mass of detailed information concerning drugs is the kind of knowledge that has real significance. Such knowledge is often obscured, on the one hand, by the disproved deadwood of yesterday's "material medica," and on the other, by the overwhelming flood of today's latest "miracle drugs."

What to do with the former is no problem. Most of the older material is so obviously irrational, useless, and outmoded that it can be eliminated from a modern pharmacology course without a qualm. (Well, perhaps not entirely without a qualm, as long as some state board members persist in framing questions based on such material. I've heard a lot of weighty explanations of this glaring example of "cultural lag" on board examinations, but the best guess is that it's just another aspect of human nature in action—the fondness we all feel for the past; in this case for the questions that we answered successfully when we took our own state board exams thirty years before.)

How to treat the newer drugs is more perplexing. Too frequently, the claims for a new drug being heavily promoted are based on a lot of distracting trivia rather than on substantial evidence. Yet, it is common for all concerned with such drugs—doctors, teachers, students, et al.—to be stampeded into paying more attention to them than they are worth.

I prefer to discuss in detail only a comparatively few of the most representative drugs in each class, trusting that the student will acquire from this discussion certain fundamental concepts that he can apply to all other drugs of the same class that he may later meet. (For example, my discussion of barbiturates last week was limited to four drugs—phenobarbital, amytal, nembutal, and pentothal; next week's treatment of analgesics will be based on morphine, meperidine, and methodon.)

On the other hand, at a time when one hears statements on every side to the effect that half the drugs in use today were unknown ten years ago, it becomes impossible to discount *any* recently introduced drug; for any such drug may turn out to be more important tomorrow than most of those in today's pharmacopoeia. Thus in my own course, I try at least to mention briefly most

new developments, and, frequently, to distribute mimeographed material containing information about those products that time prevents discussing.

In addition, I have recently taken to asking examination questions based upon newer products appearing in such sources as the latest supplements to the *Modern Drug Encyclopedia*, recent reports of the Council on Pharmacy and Chemistry of the American Medical Association, current literature being sent to physicians, and the advertisements appearing in the medical and pharmaceutical journals.

On the examination, the new product is listed in the form of a prescription and since the students have frequently not heard of the product, its components are listed parenthetically. Then follows a series of questions concerning such points as possible therapeutic indications, contraindications, side effects, toxicity, sites and modes of action, etc. The object of such questions is to make the student apply his knowledge of basic pharmacological principles to the new drug or new combination of drugs.

The students, who tend, sometimes to a fault, to demand "practical facts", seems to be stimulated by such prescription based questions. Apparently, the realization that this is the sort of information they will need in order to practice professional pharmacy gives some students the motivation they require in order to learn. However, lest I be thought ivory towerish, I hasten to add that I, too, know that some students (and some pharmacists) are so "practical" that nothing will ever interest them but the ring of a cash register. These cynics, usually working in inferior drug stores, see little use in anything they learn in a pharmacy school. It is in vain that you talk to them about such rewards as professional pride and self respect. Stranger than their inability to understand such satisfactions is the lack of vision that prevents such "practical" people from seeing the commercial value of modern product knowledge.

Now, at this point, someone may well say, "You've been doing a lot of talking about basic pharmacological principles. Why don't you get down to cases and be more specific as to just what you mean?"

Well, I would like to do just that, if time permitted but I don't think I could explore all the implications of the term, if I had another hour. As a matter of fact, I devote the first ten hours of my course to a discussion of the basic principles of pharmacology.

toxicology, and chemotherapy, and the rest of the course is just one long exposition of those principles and their therapeutic applications. The same may be said for our textbook, Krantz and Carr's "Pharmacological Principles of Medical Practice", a title which indicates the approach of the authors. I believe with them that knowledge of many specific details is less important than understanding the principles, for if the student is equipped with the latter he can more readily gain the proper pharmacological perspective. Such perspective is essential, if the pharmacist is to play his role of consultant on drugs to doctors, dentists, nurses, and veterinarians and other public health people.

The student who has acquired a scientific attitude toward drugs is able to evaluate the claims made for any new drugs. To me, this is more desirable than simply memorizing a set of new facts and accepting them uncritically.

The properly trained pharmacist should, for example, be capable of analyzing pharmacological data concerning the absorption, distribution, biotransformation and excretion of a new drug. Correctly interpreted, such data are the key to both the clinical use of the drug and to the formulation of the best pharmaceutical forms for its administration.

Thus, the pharmacist, grounded in the principles of drug absorption from various sites of action, will appreciate the significance of the dosage forms in which penicillin, streptomycin, and the sulfonamides are made available. Trained in the basic concepts of drug detoxication and excretion, he readily understands the significance of these factors in the use of such relatively new drugs as Disulfuram and Benemid. Knowing the principles of drug action at various sites and by various mechanisms of action he can take in stride the introduction of new drugs such as hexamethonium and oxyphenonium. Understanding the latter concepts and those of synergism and antagonism gives him immediate insight into the rationale of combinations such as that of physostigmine with atropine in skeletal muscle relaxants. A grasp on the principles of positive and negative summation of drug actions combined with a background in quantitative pharmacology and in the principles of toxicology is necessary, if the pharmacist is to do his duty to the physician and to the patient in the recognition and correction of toxic side effects, if they appear during treatment.

But why go on piling example on example? I'm sure that you are well aware of the practical importance of such knowledge in the practice of pharmacy at the highest professional level.

Of course, the ability to understand and apply such principles requires a solid grounding in physiology and biochemistry, just as a real understanding of the anti-infective, anti-malarial and anthelmintic drugs, etc., presupposes an adequate background in general biology and microbiology.

I am glad that in our school all of these subjects together with organic chemistry are prerequisites that must be met before the student can enter the pharmacology lecture halls and laboratories. I'm glad too that I am privileged to lay the foundation of physiological knowledge essential to a true understanding of how drugs really work. A physiology course, which has as its major objectives, the preparation of the student for pharmacology is very different from the standard physiology course taught in the Arts and Science schools. Because drugs are, after all, used in the treatment of disease, it is necessary, while teaching normal physiology, to put heavy emphasis also on the processes of pathological physiology. How else can the student gain a rational approach to the drug therapy of congestive heart failure, cardiac arrhythmias, hypertension, blood dyscrasias, allergy, epilepsy, constipation, and cough, to name a few of the conditions in which drugs are indicated? How can he really understand the cautions and contraindications in the use of various drugs without an understanding of the pathological processes involved in fatty degeneration of the liver or in glomerulonephritis? And how can he comprehend the great qualitative and quantitative differences in response to drugs, unless he is familiar with the underlying pathology that frequently accounts for the wide variability with which different individuals respond to the same dose of the same drug?

There are those both in pharmacy and in medicine who claim that such studies are superfluous. "You can't train doctors in school", they cry, "and even if you could, such training would be unnecessary and unwise".

The cynical student will sneer that he has never seen any physician consult *his* boss about drugs, and that any such advice would be spurned by the doctor. And some doctors, it is true, do feel that the pharmacist, equipped only with the proverbial little knowledge



that is a dangerous thing, may wrongly feel himself qualified to diagnose and to counter-prescribe.

Both of these views are in my opinion, narrow and misguided. Physicians, pressed for time to keep up with the practice of their own specialities, are only too glad to get information about new drug developments from detail men, hospital pharmacists and retail pharmacists. The catch is that the pharmacist must first win the respect and confidence of the physician by demonstrating his understanding of basic pharmacology and therapeutics. The pharmacist, who has never shown any interest in acquiring such understanding can hardly expect the physician to discuss drugs with *him*. And doctors can be sure that the more a pharmacist knows about the complexities of disease mechanisms and of drug actions, the less is he liable to infringe upon the prerogatives of the physician. Training in the nature of pathological processes and in pharmacology gives the awed and humble pharmacist a real appreciation of the artful judgment that the physician must have in order to diagnose and treat illness.

Thus, the professional pharmacist who has studied various medical sciences is not tempted to counter-prescribe. On the contrary, he is aware of the limits of his medical knowledge, and he realizes that his own field offers vast opportunities for public service. Such service may well include the dissemination of authoritative information about such conditions as heart disease, cancer, tuberculosis, and venereal disease. But what pharmacist with proper training would ever deem himself qualified to treat any of these conditions?

In conclusion, then, while I agree that it is impossible and undesirable for the colleges of pharmacy to attempt to teach all of the preclinical medical school subjects, I am convinced that the broadest possible background in medical science is desirable and necessary, if the pharmacist is to fulfill completely his obligations to the public and to the other public health professions.

## The University of Arkansas School of Pharmacy\*

ROY H. JONES

The University of Arkansas School of Pharmacy originated under rather unusual circumstances. At its beginning in September of 1951 the school was presented with the dual problem: (1) the establishment of a new major division of the University, (2) making provision for an established student body inherited from the College of Ozarks School of Pharmacy.

Since there was no dean the solution of these and other problems was entrusted to Dr. Stanley G. Mittelstaedt, newly appointed assistant dean. The position of Dean had been committed for a future date.

This report intends to indicate the development of the School with particular reference to its curriculum, staff, and physical facilities. In addition future prospects of the school will be discussed.

### Staff

From a small nucleus the faculty has now grown to six full time members with professorial rank, two part time faculty members and two laboratory assistants. Five of the faculty hold doctorate degrees and two others have masters degrees. The above faculty have attended colleges and universities in nearly every section of the nation. These members hold degrees from more than a dozen universities including Tennessee, Wisconsin, Creighton, Purdue, Texas, Michigan, Florida, Niagara, Washington, California and Illinois. Professionally speaking there are included on the staff seven registered pharmacists, one lawyer and one certified public accountant. Although some expansion of faculty personnel is necessary, it is felt that a splendid beginning has been made toward a well-rounded, energetic, qualified faculty. The *esprit-de-corps* of the faculty working together with a unified purpose can only spell success for this new school.

The School of Pharmacy holds an accreditation rating of Y-4 as determined by the American Council on Pharmaceutical Educa-

\*Because of the interest of everyone in the progress of pharmaceutical education in every state, the Editor requested Dean Mittelstaedt to write of the present status, the objectives and the future plans for the new School of Pharmacy of the University of Arkansas. This article was the answer.—Ed.

tion. Membership in the American Association of Colleges of Pharmacy was granted in 1952.

### *Physical Facilities and Equipment*

The School of Pharmacy is located in the University of Arkansas Graduate Center in Little Rock. Recently a temporary building was constructed to provide necessary laboratory facilities for pharmacognosy, pharmaceutical chemistry, an instrumentation room, a photographic dark room and a central stock room. Consideration is presently being given to an additional building to provide laboratory facilities for the beginning pharmacy courses, a laboratory for dispensing and compounding courses, a laboratory for pharmacology and physiology, and suitable stock and storage rooms. In every laboratory, only the most modern high quality laboratory furniture has been secured all of which will be moved into the new four million dollar medical education building which was approved for construction by the 1953 Arkansas Legislature. At the present time the last named laboratories are conducted in the Veterans Hospital and in the present Medical School building.

The present laboratories are adequately equipped with the necessary tools to make for very efficient operations. In the instrument room all of the latest and most modern instruments and equipment has been secured for every operation normally conducted by a school of pharmacy. In addition, some equipment has been secured in order to carry on basic fundamental research.

### *Curriculum*

The University's course in pharmacy is organized on the modern concept of pharmaceutical education, in which a basic education in the physical and biological sciences and in the humanities are merged with highly specialized professional training in pharmacy. Furthermore, the University recognizes that pharmacy has become an outstanding member of the health-profession team which also includes medicine, dentistry, nursing and public health. Accordingly, the basic years of the course leading to the Degree of Bachelor of Science in Pharmacy are given on the main campus at Fayetteville, as well as other accredited Colleges and Universities, with the advanced professional training being given at the University's Medical Center in Little Rock. The student thus receives all of the advantages of contact with the University and college life and completes his pro-

fessional training in the medical atmosphere which will characterize much of his later professional environment.

The University is developing its long-range program of pharmaceutical education in keeping with the recommendations of the Pharmaceutical Survey that the students be given better preparation in those foundational subjects which contribute to the training of pharmacists as citizens as well as experts in the production and distribution of drugs and medicines. The University also is impressed with the ever-growing importance of integrating pharmaceutical education more closely with medical education.

The School of Pharmacy offers its students a minimum program of study consisting of one year of pre-pharmacy and three years of pharmacy, amounting to 140 semester hours of work leading to the degree of Bachelor of Science in Pharmacy. In order to complete this curriculum, the student must carry on above-normal load of academic work throughout the four years of study.

Because of the location of the main campus of the University at Fayetteville and of the Medical center located in Little Rock a new proposed curriculum is under study with recommendations for adoption whereby properly qualified students may complete 64 hours of the pre-pharmacy basic courses followed by six semesters of professional study in the School of Pharmacy in the Medical Center in Little Rock. This plan will be of great assistance to the many students requesting such a program.

The faculty of the School of Pharmacy has under study the development of an objective program of evaluation for every aspect of pre-pharmacy and professional curriculum. Thus, attention is given to the purpose or objectives of the school and its curriculum. By this means the course objectives can be clarified in the minds of the faculty. It is hoped that the results may assist in the modification or modernizing of the curriculum, administrative procedures and methods of instruction. Shortcomings in the various departments will thus be discovered and corrected. This procedure may secure for the school greater cooperation from the administrative officials by giving those individuals in charge convincing evidence

of the effectiveness of the pharmaceutical objectives of the School of Pharmacy.

*Future Aspects of the School of Pharmacy*

As mentioned earlier in this report, the Arkansas legislature of 1953 approved the construction of an estimated four million dollar medical education building which will provide the physical facilities for the various schools in the medical professions.

The Pharmacy School will ultimately have modern laboratories and classrooms for instructional purposes. All of the pharmaceutical activities of the eight and one-half million dollar teaching hospital and the 100,000 outpatient clinic will be under the supervision and operation of the School of Pharmacy. A modern professional pharmacy has been provided in this teaching hospital where senior pharmacy students will secure valuable information and experience in the compounding and dispensing of prescriptions.

Plans are being made for the development of a hospital manufacturing laboratory where many of the more common preparations may be prepared and used by the teaching hospital and outpatient clinic. A highly trained hospital pharmacist will be secured to have charge of this phase of the School of Pharmacy instructional program. In connection with this part of the training program, it is planned to offer courses in hospital administration, manufacturing pharmacy and such other instructional procedures as are found necessary for a well-rounded pharmacy program.

In order to keep pharmacists who are already in practice informed of the progress in their profession and in the medical and allied sciences, it is planned to give refresher and continuation courses for practicing pharmacists at regular intervals. These courses will be arranged at Little Rock, and possibly at other convenient points in the state, depending upon the need for such training and the resources of the School of Pharmacy.

## A National Seminar Program for the Practicing Pharmacist\*

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Today, more than ever, the practicing pharmacist is finding himself in the role of a consultant to other members of the public health team. With many different pharmaceuticals appearing as a result of inexhaustible research, he is being called upon incessantly for his knowledge and counsel concerning newer drug developments. The practicing pharmacist is presently in the enviable position of impressing on the members of the other public health fields the broad scope of the science of pharmacy. He must not fail our profession. He must be prepared to give intelligent, accurate, and indiscriminate advice concerning available drugs. But, just as he can help raise the standard of pharmacy to newer heights by his actions, so he can also sink it to an unbelievable low by showing complete lack of knowledge concerning our armamentarium of drugs. If the practicing pharmacist wishes to maintain his advisory capacity, he finds that he is in need of continuous and conscientious study; otherwise, he quickly realizes that "science is like a ladder—you either go up or down".

Many pharmacists are doing an admirable job in keeping themselves informed of the formulation, chemistry, pharmacology, toxicology, and uses of the newer products finding their way into pharmacy, but they are indeed in the minority. The truth is that a great majority of our pharmacists are not keeping up to date. There are various reasons for this. Many of our pharmacists, especially those who finished their academic training twenty or more years ago, simply do not have the basic background which would permit them to study the newer trends intelligently by themselves, no matter how much they try. Others just cannot find sufficient time for study because of pressing business activities. And there are those who simply refuse to be bothered.

\*This paper is a contribution of the Committee on Problems and Plans. It was prepared for presentation at the A.A.C.P. meeting at Philadelphia. Because of its interests to practicing pharmacists, permission was given the author to present it also before the Section on Education and Legislation of the A.Ph.A. at the Centennial Anniversary meeting.—Ed.

I believe that our pharmaceutical educators recognize the need for seminar programs for the practitioner. I also believe that they accept the responsibility of aiding and guiding those who wish to keep up with the modern trends and moreover, I am sure that they are more than willing to undertake this responsibility.

The holding of seminars for the practicing pharmacist is not new. Indeed, many colleges and professional associations have sponsored them throughout the years. To my knowledge, in the last nine months, two concentrated seminar programs were held here in the East; possibly, more. For example, the practicing pharmacists in the Philadelphia area have had available to them two series of seminars of four, two hour lectures each. One series, sponsored by the Drug Salesmen's Association of Pennsylvania with the cooperation of the Philadelphia Association of Retail Druggists, dealt with subjects in drug store management and merchandising. The other series considered subjects in professional pharmacy and was sponsored by the Philadelphia Branch of the American Pharmaceutical Association through the cooperation of the Philadelphia College of Pharmacy and Science and Temple University, School of Pharmacy. Rutgers College of Pharmacy and the Northern New Jersey Branch of the American Pharmaceutical Association sponsored their eighth annual seminar for New Jersey pharmacists recently, consisting of two hour lectures on four successive weeks. These lectures dealt with professional subjects.

The fact remains, however, that a sufficient number of these seminar programs are not available for the majority of the pharmacists in this country. For instance, many of our pharmacists are located in rural areas not conveniently located in the sites where most of the seminar programs are usually held. We *must* locate these programs in determined strategic areas which will be most accessible to the greatest number of pharmacists. They should be given on specific dates throughout the country. With appropriate publicity, these days could well be recognized by the members of the profession of pharmacy as the time when they can become better informed of the newer developments in pharmaceuticals. It would be an excellent idea if these seminars were scheduled during Pharmacy Week. It would add something constructive to the activities of this week.



I am therefore of the opinion that both the American Pharmaceutical Association and the American Association of Colleges of Pharmacy, working together with other responsible professional groups, should give considerable attention and thought to the initiation of a plan to make available regularly scheduled seminars throughout the nation. A committee, which well could be called the National Seminar Program Committee, should be organized to consider the merits of presenting seminars to practicing pharmacists. If it is agreed to present such seminars, such questions as: the time to be devoted, locations, lecturers, subjects to be presented, and financial support must be considered. The speaker has his own individual opinions on these specific matters, but the important point is to decide first on adopting a national seminar program for the practicing pharmacist.

The organization of the proposed seminar programs throughout the nation will not be a simple task; however, I truly believe that such programs will definitely benefit many of our deserving and wanting practicing pharmacists who would certainly be eager to receive any information and guidance that can be disseminated to them. It will certainly make many cognizant of what there is to learn. Indeed, there will be many pharmacists who still will not be bothered, but the fact remains that those who do participate will benefit endlessly by the information they have gained.

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## The Relationship Between Measurements and Calculations Used in Pharmacy

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The calculations performed in connection with laboratory procedures, and the expression of the results obtained from these calculations, should reflect the precision of the measurements taken in the laboratory. One important manner in which this is accomplished is to use only those figures which are significant when recording, evaluating and interpreting laboratory data. A significant

figure is one whose presence in a calculation or a result is valid. Its validity is based on its having been obtained either by direct measurement in the laboratory, or by calculation from these measurements in a manner which follows the rules of the treatment of significant figures.

(NOTE: These rules can be summarized as follows: In addition or subtraction, drop every digit in the final result which falls under an unknown digit in any of the quantities to be added or subtracted; in multiplication and division, the final result should retain only as many significant figures as there are in the term or factor containing the smallest number of significant figures.)

The importance of the foregoing discussion is constantly emphasized in the courses in physics, physical chemistry and in quantitative chemical analysis. These concepts could certainly also be emphasized in the presentation of pharmaceutical arithmetic. There is no reason why the laboratory measurements of pharmacy should not be related to the arithmetic of pharmacy.

In this paper a brief analysis will be made of the precision of the routine pharmaceutical measurements. The calculations of pharmacy as they would be justified by these measurements will be discussed. In addition, there will be presented a brief summary of a survey made among the various state boards of pharmacy as to their attitudes toward the methods of solving pharmaceutical arithmetic problems in the state board examinations.

The routine measurements in pharmacy are the direct measurements of weight and volume. Weighings are accomplished on two types of balances. The first type—called a class A balance—is used for the smaller and more precise weighings in the range of about 100 mg. up to about 5 Gm. Its maximum capacity may permit weighings up to 120 Gm., but such larger weighings are generally more wisely accomplished on the less sensitive and less expensive class B balance. The precision of the weighings done on a class A balance can be considered to be the sensitivity of the balance. The sensitivity of this type of balance is permitted to be 13 mg., but generally it requires only 10 mg. (or even less) to cause the pointer to be deflected one pointer scale division. A weighing on this balance is thus made to a precision of  $\pm 10$  mg. The precision of a weighing of 300 mg. can therefore be expressed as  $300 \pm 10$  mg. This is equivalent to 1 part in 30. Similarly, 1.32 Gm. is weighed

to a precision of  $\pm 0.01$  Gm., or 1 part in 132. Admittedly, the sensitivity of a balance decreases with the addition of increasing weights. This factor, however, will be ignored in this presentation because the slight differences involved will not alter the basic points of the presentation.

A class B balance is generally used for weighings of 1 Gram and over, the maximum, depending on the balance, being anywhere from 30 to 120 Gm. The sensitivity of this balance is about 30 mg., and therefore the precision of the weighings done on the balance is  $\pm 0.03$  Gm. A weighing of 2.60 Gm. would be precise to  $\pm 0.03$  Gm. (equivalent to 1 part in 87); a weighing of 360 grains would be precise to about 1 part in 720.

The measurement of volume in pharmacy is generally accomplished with the use of conical graduates. The taper of these graduates varies from top to bottom. In some of them, the volume between the graduations near the top and wider portion of the graduate is greater than the graduations near the bottom of the graduate. For example, the graduations of the 125 cc. conical graduate are 5 cc. apart to the 50 cc. mark, and are 25 cc. apart from there upwards. For the sake of obtaining an approximate measure of the precision of the volumes measured in these graduates, it will be assumed that, for the graduates between 30 cc. and 1000 cc., one can measure to a precision of  $\pm 0.2$  of the distance between two graduations. This is presented as a maximum precision, because it is quite doubtful that a greater precision than this can be obtained. Measurements taken near the top of the 125 cc. graduate will, therefore, have a precision no finer than  $125 \pm 5$  cc. (1 part in 25). While the measurements near or below the 50 cc. mark will have a precision no finer than  $50 \pm 1$  cc. or 1 part in 50.

By inspection of the other conical graduates, and by similar reasoning, the following are the assumed finest precisions with which volume measurements can be made: A 30 cc. graduate is precise to from 1 part in 30 to 1 part in 50. A 60 cc. graduate is precise to 1 part in 60. A 250 cc. graduate is precise to 1 part in 50. A 500 cc. graduate is precise to from 1 part in 50 to 1 part in 100. A 1000 cc. graduate is precise to from 1 part in 40 to 1 part in 100.

The graduations on the 10 cc. and 15 cc. graduates are 1 cc. apart. It may be assumed that measurements cannot be made with a precision finer than  $\pm 0.5$  of the distance between two graduations

which corresponds to  $\pm 0.5$  cc. The precision of the volume measurements on these two graduates is therefore respectively no finer than  $10 \pm 0.5$  cc. (1 part in 20) and  $15 \pm 0.5$  cc. or 1 part in 30.

Cylindrical graduates, especially used in the chemistry laboratory, offer some interesting comparisons. The diameter of any of these cylinders is the same throughout its length. The volume between the graduated divisions ranges from 0.2 cc. (10 cc. graduate) to 10 cc. (1000 cc. graduate). Compared with the conical graduates, however, the divisions are more closely spaced. If it is assumed that measurements can be made to a precision of  $\pm 0.5$  of a graduated division, the precision with which a measurement can be made near the top of these cylinders is calculated to be in the narrow range of 1 part in 100 to 1 part in 250, depending on the size of the cylinder. Measurements made near the middle of the cylinder would be made with about one-half this precision. These cylindrical graduates enable one, therefore, to measure volume with greater precision than the conical graduates used in practically all pharmaceutical work.

It is thus seen that the precision of all the pharmaceutical operations described above range from about 1 part in 20 to about 1 part in 700. Although some of the assumptions made in the above discussion are debatable, any such debate on these issues would not substantially alter the range of these precisions. Were some of the other operations involved in the dispensing of a prescription also included—such as the precision with which capsules are filled or a teaspoonful is measured—the precision range presented might be altered, but it would not be altered in the direction of greater precision. It can be concluded, therefore, that the routine operations in pharmacy are conducted with a precision certainly no greater than 1 part in 1000, and often in a range less than 1 part in 100.

The precision of pharmaceutical measurements is a concept which some educators have presented to the students of pharmacy. But it would appear worthwhile to more generally introduce this concept into the courses of pharmaceutical arithmetic and in the first laboratory course in pharmacy. In the laboratory, the student should be encouraged to consider for himself how precise are his

weighings and measurements, and to justify the use of a piece of equipment for each operation. Since an experiment can be no more accurate than its least accurate step, the student should be made aware of which are the least precise steps in a compounding operation; added care or a different piece of equipment could then be used at that step so as to try to bring the precision of that step into line with other more precise operations. This concept, coupled with a class exercise in the calibration of several sizes of prescription bottles will supply to the student an answer as to whether a prescription may be made up to its final volume in a prescription bottle. In any case, the student will be encouraged to develop his powers of judgment.

In pharmaceutical calculations, the precision of pharmaceutical measurements appears to support the use of three significant figures in all calculations. The use of only two significant figures even appears justified in some manipulations, but since a precision of fairly close to 1 part in 100 or better is feasible in many pharmaceutical operations, the use of the three significant figures does not appear excessive. Three significant figures are reasonable to use when the precision of the measurements is in the range of 1 part in 100 to 1 part in 1000. Since no routine pharmaceutical operation is done with a finer precision than 1 part in 1000, the use of four or more significant figures in pharmaceutical calculations is simply not justified. The well-known pharmaceutical equivalents when correctly rounded off, then become 15.4 grains in a gram, 29.6 cc. in one fluidounce and 473 cc. in a pint. The rules of significant figures could be presented to the students, and they could be allowed, and even encouraged, to use a slide rule (automatically three significant figures) in performing the arithmetic.

When the ideas in this paper were presented to several pharmacy teachers, the comment was made that it would be appropriate for these ideas to first obtain the approval of the pharmacy state board examiners. Otherwise, the students so trained might not receive full credit for their papers in pharmaceutical arithmetic from the state board. In order to ascertain the views held by the pharmacy state boards in these matters, a list of questions was sent to each state board secretary. The list solicited certain information

which is summarized as follows: (1) Are exact equivalents required in the pharmaceutical arithmetic calculations or are approximate equivalents containing three significant figures permitted? (2) Do the number of decimal places or the number of significant figures govern the equivalents to be used and the final answers to be submitted? (3) If the candidate uses either exact or approximate equivalents, is he given credit if he merely sets up and correctly solves the problem?

Answers were received from 36 states, Alaska and the District of Columbia. The answers can be summarized as follows: Exact equivalents are required by seven states. Approximate equivalents are acceptable to eighteen states. The candidate may set up and solve the examination problems in his own way in twenty-one states. The work must be done to a given number of decimal places in about five states. The choice of equivalents and calculations based solely on significant figures is a concept not now accepted by any state.

Based on an analysis of the precision of pharmaceutical measurements and the findings of this survey, the following recommendations regarding the pharmaceutical arithmetic examination have been respectfully submitted to the Boards of Pharmacy:

1. The rules of the various states governing the equivalents and calculations be made somewhat uniform.
2. The use of three significant figures for all equivalents and calculations be made acceptable.
3. The candidate be required to set up the steps of the problems, but be permitted to use a slide rule to perform all calculations.

It may be added parenthetically that in future years more and more pharmacy students will be taught how to use a slide rule in their courses in college algebra and in physics. There is no reason whatsoever why pharmaceutical calculations cannot be successfully made with a slide rule.

These recommendations are being presented to the state boards of pharmacy for their acceptance. Favorable action on these recommendations will at least enable a pharmacy teacher to present to his students the concepts outlined and suggested in this paper while fully knowing that the state board examiners will view favorably the methods that the students will eventually use when taking the pharmaceutical arithmetic examination.



## Use of Financial Controls in the Retail Pharmacy\*

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and**

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Today's competition for the consumers dollar is rendering extinct the ancient mariner who charted his route by the use of "Seat of the Pants" navigation, and who fixed his financial position by a rough guess at his check book balance. In the modern competitive market of this era, the pharmacist should know his exact financial condition, his past and present operating efficiency and above all, be able to plan his future courses with exactness, knowledge and speed. The only way decisions in these matters can be reached correctly is through the constant use of the recognized financial controls available to the retail pharmacist through the joint efforts of those familiar with economics, pharmaceutical management, and accounting.

To attempt a tight, all inclusive definition of financial controls is useless, the term grows as our knowledge of retail pharmaceutical management grows, it expands as we are introduced to new concepts of retail economics and accounting. While the terminology is new in its application to retail pharmacy, it is as old basically as the first profit and loss statement. All that we have done is to specialize a broad science to fit a specialized field of retailing.

Before beginning the main discussion of financial controls, let us recognize that we are discussing two distinct operations when we speak of a retail pharmacy. First, a retail store selling packaged, weighed, or counted items; secondly a manufacturer who in the prescription room custom manufacturers medications for the sick, including the mere relabelling of an item.

In ordinary retail accounting procedure we do not include the cost of labor in computing a retail cost of goods sold, but, in a standard manufacturing accounting procedure, cost of direct labor and expenses are integral parts of the cost of goods manufactured. This conflict between these two accounting rules involved in the

\*Read before the Section on Pharmacy Administration at the 1952 meeting at Philadelphia.



computation of the cost of goods sold in the retail pharmacy has been for the most part ignored, and a straight retail approach has been applied to the retail pharmacy as a whole. Today the prescription volume of the retail pharmacy is entirely too large to permit the continuation of this oversight, and we must as a result develop a new approach to prescription room accounting.

Generally a retailer is desirous of controlling his income and expense accounts as well as his asset, liability, and capital accounts, because he realizes that without one control the other is worthless. In addition, he wants to be able to compare his current operations figures with the trade at large, and with his prior years' operating figures, and to establish his capitalization needs, his sales potential, and his basic inventory. Most important of all he must be able to find and eliminate weak spots in his business operations and to plan for expansion of the better operating departments.

Any combination of figures, ratios, records, and budgets that enable the retail pharmacist to accomplish these objectives are classified as financial controls.

Departmentalization of the retail pharmacy is a prime necessity for the establishment of any adequate financial control. The need becomes obvious when we consider the wide variation between certain departmental margins, ranging between 20% to 60%, the large difference between labor costs, from 51 cents to \$4.20 per hour and the huge variance in inventory turnover rates which run from 1.5 turns per year to 12. A generality as to any of these prime figures is worthless and a lumping together of these figures into one composite figure serves only to allow the weak spots to go undetected at the expense of the stronger departments.

A simple form of departmentalization is obtained by dividing the store into these departments that vary from each other in some basis operational form, such as a breakdown into five departments, consisting of prescription, drug and sundry, cosmetic, tobacco and candy, and fountain. Any division beyond this is apt to prove more time-consuming than profitable.

When departmentalization is undertaken, it necessitates a breakdown of inventory, sales, purchase and expenses into the component departments operated within the store. While it is not too difficult to break down sales and inventory into the designated departments, it often proves cumbersome to attempt this operation with purchases,

particularly when developing a purchase breakdown between cosmetics, prescription and drug, and sundry departments inasmuch as many sources of supply service all three departments. To facilitate the division of purchases between these three departments we have found that a code breakdown on the invoice sheet proves helpful.

Thus each invoice can be broken down into three overlapping departments and the totals added together to prove the addition on the bill. While this may be a lot of additional work, we feel the end result is well worth the investment of labor.

The first financial control the retail pharmacist mentions when discussing his business, is his margin, also referred to as "gross", "mark-up" and "what is left to cover expenses." Of all these terms the last one is the crudest but perhaps most descriptive, because margin in its basic form is just that.

In order to clear away the conflict of terminology existing between the retail accounts usage of gross profit, and managements usage of mark-up on cost or sales, both referring to the same computation, we have selected neutral ground by using the term *Margin*, *Margin being sales volume minus cost of goods sold*. When in a percentage form it is a ratio of dollar margin to dollar sales.

The usage of margin by itself as a financial control has been over-emphasized at times by retail pharmacists. It is at best only a guide post and a beginning in the proper control of the modern retail business. True, margin does act as a measure of the efficiency obtained in the retail pricing of the merchandise sold through comparison with prior years margins and through comparison with competitive and trade margins. It also indicates possible shrinkages in inventory due to carelessness and outright theft, and finally it is a fairly reliable measure of the buying efficiency of the operation.

We cannot urge too strongly the necessity of a strict margin control in today's prescription departments. The recent advent of extremely high-priced medications with the easy resale market that accompanied them makes pilferage a major risk in a department originally almost free from shrinkage. Exact margin control is easily established through the dual pricing system developed later in this paper.

By the use of the information obtained from margin control, we can now develop the more complex financial controls necessary for the proper management of the retail pharmacy.

**Turnover.** Turnover rate is the number of times a particular item or group of items is sold and replaced in stock in a single year. Taken as a store-wide or department computation it actually means the number of times a year the dollar value of the inventory was utilized in creating the dollar sales volume. Since all items within even the most specialized departments vary considerably in the price, in the frequency of customer demand, as well as in contributed margin, turnover rate is only a dollar computation of a very general nature, useful for estimating the overall efficiency of the retail drug store. While it indicates the overall health of the store, it does not point to the dead wood which is carried along by the faster moving items.

Part of the establishment of a turnover rate involves the use of the dollar inventory value for a particular group of items. Retail pharmacy inventory in most departments is fairly constant, and for this reason the use of a computed average inventory is often unnecessary. Where department inventories are known to vary from season to season, or where a series of lines have been added or dropped from these departments, it is essential to compute an average inventory. This is accomplished by the use of an opening inventory, with monthly additions for purchases and subtractions for sales which have been reduced to a cost figure by the use of the current years margin ratios. These monthly computed inventories are then averaged together to arrive at an average annual inventory.

While turnover rate indicates the speed at which inventory dollars are turned into sales dollars it is no indication of the relative value of the sales dollars as profit producers. It is possible for a very high turnover rate to produce a lower department dollar profit than a low turnover rate, especially in today's short profit lines. In order to establish the comparative values of the turnover rates, it is essential to multiply each rate by the net profit ratio earned by the department. For example, a turnover rate of two times a year in a department earning 10% net profit, equals an index number of 20. A companion department with a turnover rate of 3 times a year earning a 6% net profit results in an index number of 18. This index number multiplied by the inventory equals the dollar profit earned in the department, and acts as a useful guide to sales potentials in new and future operations.

The profit ratio turnover rate index just described indicates to the retail pharmacist just where dollar inventories can most profitably be reduced, where dollar capital investments will earn the most return, and where inventory dollars are being carried at too low a markup for their turnover rate.

In general, the good manager should look for an increase in annual dollar profit in a department when he increases his inventory. The amount of this dollar profit increase should equal the net profit turnover index number multiplied by the increased inventory. An interesting result of the application of this control has been experienced during the past three or four years when applied to the prescription room. We found in case after case that a reduction in dollar net profits accompanied each increased investment in inventory. In other words, increasing prescription inventory requirements are further reducing the net profits earned on dollars invested, because prescription manufacturing costs are increasing at a faster rate than prescription prices.

Just as internal comparisons through the use of the turnover rates and the net profit turnover indices indicate where inventory dollars are being invested without proper return, comparisons with average trade operations aid the retail pharmacist in judging for himself the efficiency of his policies. Comparison with average trade operations are of value only where local and individual characteristics are considered along with the actual numerical values presented. The second guide to use in comparisons, both internal and trade is the actual function of the department. Many fountains remain purely as traffic builders and many a cosmetic department is maintained for prestige. Classify departments accordingly and recognize them for their limitations, computing their cost in labor, capital investment, floor space, etc. It is poor business to sacrifice services, traffic or variety of stock items, however, you can limit them to a dollar cost in line with the increase volume they create in companion departments.

**Buying.** Just how much and what to buy can easily be the topic of a complete text; but fortunately the financial control aspect of purchasing can be treated within the scope of this paper.

We recognize two major limitations upon purchases—First, the total dollar purchases necessary to properly stock our shelves and to maintain the correct selection without increasing inventory beyond

the point of profitable operation, and secondly, the cash available to pay for these purchases when the invoices are due. *To develop a buying control without first computing and budgeting ability to pay for purchases is foolish.* The cash income of a business is the amount of cash to be received from sales, accounts receivable, and other sources of income. From this cash income we deduct fixed and variable expenses and fixed capital charges, including notes payable, mortgage payments, personal drawings and reserves for future cash withdrawals and tax payments. Because of the large amounts of cash involved in the collection of sales, excise and withholding taxes, we advise the maintenance of separate accounts for these sums. This cash budget is based upon items arising in the month coinciding with the purchase budget month, despite the fact that the bills may be due in the ten day period following the close of the budget month. We now know the total cash available for payment of purchases and we can develop a purchase control with this figure as an absolute ceiling. This cash control is an absolute necessity if the retail pharmacist is to escape the necessity of investing additional cash capital to meet heavy cash demands during any particular period.

With the cash budget as a ceiling control we can easily establish an "open-to-buy" system of purchase control. Under this system an anticipated sales figure for each department for each month is established and the cost of this volume of sales may be computed through the use of the departments margin ratios.

This is the amount of merchandise to be purchased during the month if we intend to keep our inventory constant. In absolute theory the correct method of controlling purchases against this budget is to deduct the dollar values of the orders as they are placed with suppliers. This method may entail an excessive amount of pricing in the ordering of merchandise from jobbers. To limit the time involved we suggest a slight variation involving the use of invoices-as-received instead of orders-when-placed as our control.

The estimated cost of goods to be sold is our open-to-buy (barring a decision to increase or decrease the base inventory). As merchandise is received we subtract the amounts of the invoices from the open to buy, at all times maintaining a running balance. At the end of each month the purchases in excess of the budget are subtracted from the following months open to buy. In addition to this computation, an adjustment for the actual sales volume as com-

pared to the estimated volume is made. This consists of computing the cost of the merchandise sold in excess or below estimated sales. This figure is then added to the following months open to buy if it arises through an excess of sales, or subtracted if it arose through a sales figure short of the estimate. Wherever inventory increases or decreases are decided upon, the open to buy budget can easily be adjusted to allow for such increases or decreases always controlled by the cash budget to prevent too rapid an involvement of the cash reserve.

**Inventory Control.** While open to buy budgeting develops a general idea of the amount of dollars that can be spent on merchandise, it does not express the items and units that must be bought. This belongs to that portion of financial control called inventory control.

The number of units of each item that constitute a proper order is the biggest question in the minds of today's retail pharmacist. Too large an order prevents the purchase of other merchandise, too small an order means lost sales, lost discount and excessive handling costs. Once we discover the number of units sold in a year of the individual item, and what the most profitable and desirable turnover rate should be, we can clearly establish our unit purchase program.

Most retail pharmacists profess to be too busy to keep a complete inventory control. For those managers and for those owners with small stores we have used a test pattern system which we feel is adequate. A group of related items are listed on an index card with a numerical inventory as of the tests opening date. This group is best limited to 20 fast moving items within a section. A marker is tacked in front of the items under control will act as a reminder to the person stocking the shelves to enter all additions to the shelf stock on the card which is placed on the side of the shelf. At the end of two weeks a second inventory count is taken and the number of units sold is computed. This test can be rotated around the store and repeated at various times to acquaint the buyer with the general movements of a substantial part of the stock. We have taken this unit turnover test one step beyond the weekly or projected annual movement total and tied our turnover rate of the individual item directly total departmental sales volume. For example, if item X moves at the rate of 20 units per \$1000 sales volume recorded in the department, experience has shown that where sales volume in-



creased \$500, 30 units would be moved. With this additional control the druggist is able to adjust for seasonal sales variations within a department. Seasonal items are a problem in themselves, but by keeping the card from one year to the next we can judge the unit movement in relationship to sales.

*Our next problem is, how many weeks supply to buy at a single time.*

The chain drug store operators set what we believe as an absolute minimum as their general rule, namely a two-week turnover of an item requisitioned from the warehouse and a one month supply when buying direct, keeping their basic order point at one week's supply for a warehoused item and a two or three weeks' supply, depending on delivery, for direct items. An interesting point in this turnover picture is the fact that their turnover does not exceed their billing period and they are thus working on the supplier's inventory at most times. For the average retail pharmacy we do not anticipate this close control over purchase operations. In today's market the accepted turnover period is between 4 and 13 weeks—too large a leeway to assure any close purchase procedure. Experience has shown that a 4 week supply of national brands—short profit-lines, and a 6 week supply of longer profit items is a fair rule of the thumb, on wholesale items; the larger the margin the further ahead the pharmacist can order, so that direct orders can be for as far ahead as 75 days where needed. Orders should be placed on all items so that no item is below a 2 week supply when reordered from a wholesaler and none below a 5 week supply when ordered direct. Rapid turnover is not the basic question involved in inventory control, but, profitable turnover is. The threat of lost sales due to out-of-stock items, of lost discounts, or high costs, due to poor buying and of higher merchandise handling costs, are all to be weighed against the danger of unbalanced inventories due to poor cash position, overstocking, deterioration and spoilage, *as well as high cost of keeping inactive inventory on the shelves.* While experience is the best teacher in arriving at the profitable order for each item, the prior consideration of several of the following factors aids in gaining this experience:

1. The space necessary for storage of the merchandise—be sure to charge it rent.
2. Is the supply readily available?



3. Is the market price likely to rise or fall—and will the rise be offset by the costs involved in holding the merchandise on the shelf?
4. Will the extra discount be absorbed by the lower turnover?
5. How long a life expectancy has the item and the package?

Over the past five years we have watched with great interest the strides being made in the chain operated pharmacies, in the use of inventory control for the major portion of their merchandise. The basic requirements of any inventory control is that it is easily understood and operated, flexible as to items controlled, practical in providing information, and finally adaptable to individual stores. The time consumed in operating inventory control is more than compensated for by the time saved in ordering procedures, in computing of the size of turnover, in stock handling, in increased turnover, in removing or limiting slow moving items from the shelves, and finally, eliminating "outs", while balancing inventory investments. The chain drugstore operators have long realized that every dollar invested in inventory must earn its maximum return, but never at the expense of poor assortments. This same principle applies to the independent druggist as well. The high cost of investment capital makes inventory control a must for every store with an inventory of over \$50,000 to eliminate over-stocking and outs, and to procure the turnover rate that earns the best profit result. An inventory of this size is beyond being effectively controlled by guess work.

By inventory control we do not mean perpetual inventory, but rather a regulated placement of stock throughout the retail pharmacy and its stockroom. The establishment of a visible control for minimum and maximum quantities and a flexible record which will indicate item placement, minimum and maximum quantities, turnover, and receipt merchandise as well as placement of orders for merchandise. At the present time a new system is being designed and tested that promises to be flexible and adaptable enough for the average retail pharmacy, and in addition be complete without being too time consuming.

Now that we have a dollar ceiling regulated by our cash available, and our open-to-buy budget and an individual purchase control based upon our turnover rate experience, or an inventory control, we have complete financial control over the purchasing operations of the retail pharmacy.

**Break Even.** Let's go back to the old time pharmacist who defined margin as "What I have left to pay my bills with." He knew

that a certain amount of cash had to be available to pay his operating expenses each day and that it had to be obtained through the profitable sale of his merchandise and services. Dollarwise these expenses are limited to dollar margin. *The point at which expenses equal dollar margin is the sales volume breakeven point* and any sales in excess of this volume creates dollar margins free and clear, except where there are variable expenses. Through the use of departmentalized expense budget and department margin ratios, we establish this breakeven sales volume point as a guide to profit potential in a retail pharmacy. We can also utilize this budgeting procedure properly departmentalized, to analyze the contributing net profit of each department, thus spotting those departments that may be overly expensive to operate, despite their good dollar margins.

Through the use of estimated future expenses, based upon prior experience, projected into the current operation program, or upon comparative current operations properly adjusted to our locality and individual operation, we can establish dollar values or ratios to sales for every budgeted expense.

Through our survey of retail pharmacy operations we have found this expense budget is a most important financial control whenever a new enterprise is under consideration, as it spells out the minimum margin and sales volume necessary to breakeven. Where certain fixed capital charges are known to exist it is best to treat them as expenses in this budget in arriving at a breakeven sales volume. In actual operation this control is simple and limited to a formula containing only one unknown—Sales.\*

During the course of developing financial controls for retail pharmacists we have constantly been asked the question—"Why am I doing more business but making less money despite all these fancy controls we've installed?" This question indicates two things—First an increase in business and secondly a sudden increase in constant expenses. In short the retail pharmacist finds himself in the twilight zone sales expansion, experiencing the pains of increasing his constant expenses at a dollar rate higher than his dollar margin increase. His constant expenses may vary temporarily but once they reach a new position they will become constant again.

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\*Breakeven Sales Volume =  $\frac{\text{Expenses in \$}}{\text{Margin \%}} \times 100$

In budgeting expenses it is best to clearly understand which expenses will vary with sales volume and which are constant or fixed. Normally, we consider delivery and charge services, rent (where based upon a percentage sales volume) certain insurance costs, maintenance, taxes and sales salaries as variable expenses, and they are computed individually as a certain percentage of the sales volume. Accordingly our constant or fixed expenses are flat rentals, fixed basic salary, utility, insurance, permits, advertising, depreciation, capital costs, and capital charges, repairs, legal and accounting services.

In order to arrive at the break-even dollar sales volume needed to meet these expenses we add the known dollar expenses to the variable expenses expressed as a percentage of sales and divide the total by the margin ratio. Thus the retail pharmacy department with a variable expense totaling 12% of sales and a constant expense of \$300 per month earning a 40% margin will have a computation of  $.12x + 300 = X$  or \$1,071.50 breakeven sales volume.

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.40

**Sales Volume.** Any operation with sales volume less than its breakeven sales volume will be constantly decreasing its capital or investing new capital. In many instances, unrealized reduction of inventory or increased liability will hide this decrease in capital, but the missing cash dollars to pay the expenses must come from the shelves, from creditors, from investment or from bank, whenever they are not available from sales.

Through the proper use of this budget, dollar values can be applied to the purchase of operating pharmacies, and to the evaluation of new locations. In addition to this use of the budget the operating retail pharmacist can evaluate the value of new departments, or of increased sales in the existing departments.

The overall expense pattern is best divided into the component departments of the retail pharmacy, charging the expenses directly to the departments that increased them. In this manner delivery salary and expense, charge service, taxes, insurance, advertising, interest and accounting can be charged to the individual departments in direct proportion to their sales volumes, while rent, utility, and maintenance can be charged on the basis of floor space occupied. The payroll breakdown between departments is best based upon the

time spent in each department and the base wage rate applicable to comparative labor. This theory of weighing payroll rates for each department is further explained under the discussion of "prescription pricing control".

Now that we have examined the three phases of financial control of operations, namely, purchases, margins, and expenses, we can better develop a group of inter-related controls which have proven themselves to be of great utility in retail pharmacy management.

A retail pharmacy can earn the margin necessary to pay expenses and earn a net profit only through the transfer of inventory dollars into sales dollars.

Thus each dollar of inventory must earn enough to warrant its being purchased and sold. Just how much it must earn depends on how frequently it is turned into sales dollars. *Through the interrelation of turnover rate, and expense budget, we can determine just how much of an expense burden must be borne by each inventory dollar.* This figure will indicate the net profit instead of the margin that an item earns in relation to its turnover, and acts as a guide to better buying through an understanding of the cost of keeping merchandise on the shelf. The simplest method of establishing this burden is to first compute the turnover rate of the inventory, and divide it into 52 to arrive at the number of weeks it takes to complete one stock turnover. Then establish the total business expenses for the year and express it at a percentage of total sales. The final step is to divide this percentage by the number of weeks necessary for one stock turnover and we arrived at the burden in cents that each inventory dollar must bear each week it is on the shelf. This figure can be made into a valuable constant by being applied to the buying program when the pharmacist is considering his most advantageous turnover rate. The lower the turnover rate the longer it remains on the shelf and the more burden it must bear and as a corollary the larger the discount must be before we can increase the basic order.

When we opened this discussion we mentioned the need for departmentalization in our retail pharmacy accounting. In the consideration of the expense burden borne by each dollar of inventory we suddenly recognize the absolute necessity of such a departmental breakdown. The huge variation between departments in turnover rates as well as the fairly large variations in department expense can

well invalidate the whole theory behind inventory expense burden by creating incorrect impressions if we attempt the use of composites of several varied departments instead of valid departmental expense figures.

**Prescription Profit as Control.** We have gone down the line exploring each and every facet of the overall operation of the retail pharmacy, setting up financial controls as we progress to aid in its proper management. Let us now go back to the very beginning of this discussion where we advanced the theory that the prescription department of today's retail pharmacy must be considered as a manufacturing rather than a retailing operation. Thus, we must review our financial controls for adaptability to this department.

Margin has been defined as the sales less your cost of goods sold. In most departments of the retail pharmacy we compute the cost of goods sold from our opening and closing inventories and our purchases. In the prescription room we must discard this principle and compute our cost of goods sold in the same manner as we would in any manufacturing business; namely cost of ingredients, cost of container, cost of direct labor and prescription room expense burden. The total of these figures is the true cost of any prescription. The computation for the cost of ingredients and container are readily by a breakdown of the man hours spent by the registered pharmacist per minute cost of labor required on a prescription is best computed ascertained by proper coding of the prescription room inventory. The per minute cost of labor required on a prescription is best computed by a breakdown of the man hours spent by the registered pharmacist in the two classifications of labor;—professional which also includes ordering and stocking for the prescription room and non-professional or sales. The hourly wage prevailing in the locality for non-registered employees of ability to handle the sales or non-professional work is multiplied by the hours the registered man is employed in these tasks. This resultant is then deducted from the daily wages actually paid to the registered man and the balance represents his professional wage. This professional wage is divided by the total number of minutes engaged in professional employment to arrive at a per minute charge for the time spent in compounding and dispensing.

By departmentalizing direct expenses we can easily arrive at the total expense burden to be borne by the prescription room, and divided by the number of prescriptions arrive at an overhead charge per prescription. These three basic figures are our cost of goods

sold. The advantages in this approach to prescription margin is multifold. First, we have a clearer picture of what our correct cost or B/E is, a fact that is often hidden in the extremely high cost of labor charges applicable to prescription work. We can then establish an equitable professional rate to be added to each prescription and thus control our prescription room profit.

In order to simplify the cost of prescriptions and also control profits, the firm of Becton-Dickinson has arranged with the authors of this paper to distribute to retail pharmacists a universal prescription costing calculator. This device permits the retailer to compute the cost of each prescription instantly and easily. This cost can then be marked up any amount to provide the individually desired net profit or professional fee.

### CAPITALIZATION CONTROL

The correct capitalization and the proper maintenance of the liquid assets of the retail pharmacy have been all too often ignored in the establishment of the financial controls of the business. We all understand the dangers of under-capitalization with its accompanying expensive borrowing, its slow strangulation of business under today's expanding inventory conditions, and finally its inevitable result in poor expansion policies. *In the final analysis of any business that requires extensive inventory it is the capitalization that controls the maximum sales volume potential and the net profit derived therefrom.* Let us follow this line of thought for a moment. Capitalization controls the amount of inventory available. An increased inventory (at proper turnover rates) increases sales volume. This increased volume earns almost expense free margins. Without proper capitalization we find little ready cash to meet current obligations with a corresponding decrease in inventory or increase in debts. Decreased inventory means lost sales and poorer turnover.

A capitalization that indicates a sufficient cash position to meet currently due liabilities, a balanced inventory with the proper turnover rate, a currently accounts receivable, along with a discountable accounts payable position and a healthy reserve for future maturing liabilities is as important to the proper management of a retail pharmacy as a good margin. Those portions of the balance sheet which reflect these elements of capitalization are essential financial controls. Many a retail pharmacist with the aid of his accountant has been able to plan his way out of a business slump by moving as-



sets into a more liquid position, by undertaking certain limitations upon expenses to allow for the accumulation of liquid assets, by long term borrowing to ease off a temporary frozen asset position, all moves that are impossible without a proper financial control.

The proper breakdown of the essential portions of the operating statement can aid immeasurably in the financial control of the retail pharmacy. Throughout this paper we have held out for proper departmentalization; here in the operating statement we best appreciate the value of this method. The comparison of department operations will make planning for the coming year easier and allow for both inter and intra store comparisons. It points out advancements in operating methods and more important indicates the mistakes we have made.

The use of standard ratios and percentages in the development of the financial controls of the retail pharmacy is extremely wise. Some of the better known ones have been discussed, such as turnover rate, margin and expense ratios. The most exasperating ratio to the retail pharmacist very often is the return on an investment or the ratio of earnings to capitalization, which had best prove to be a minimum of 10%, since this represents return on risk capital at best. Beyond this point we feel that further use of ratios and percentages are useful but not of prime importance.

We have attempted to develop an awareness to two basic needs in the establishment of today's financial controls for the retail pharmacist. 1. Departmentalization. 2. Treatment of the prescription department in regard to costs. Without these two points the establishment of financial controls is at best a very sketchy aid to the retail pharmacist in his competition for the shrinking retail drug dollar.

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## Marriages

Dr. R. H. Miller, University of Minnesota, College of Pharmacy, and Miss Dorothy M. Lasson of Central City, Minnesota, on December 23, 1952 in St. Paul.

Dr. Theodore O. King, University of Wyoming, College of Pharmacy, and Miss Dorothy Lillian Sillman of New York City, December 28, 1952 in the Sara Delano Roosevelt house in New York City.



## **The Integration of Hospital Pharmacy Administration Into the Pharmacy Business Management Curriculum**

**S. B. JEFFRIES**

**Assistant Professor of Pharmacy Business Management  
and**

**ISIDORE GREENBERG**

**Assistant Professor of Pharmacy, Brooklyn College of Pharmacy**

During the past fifteen or twenty years hospital pharmacy has, as the result of a magnificent growth, finally come into its own. This is evidenced by a great many events. Among these are: the creation of more and more hospital pharmacies under the supervision of licensed pharmacists; the creation of a division of hospital pharmacy in the A.Ph.A.; the organization of many local associations of hospital pharmacists, as well as the American Society of Hospital Pharmacists; the promulgation of elective courses in hospital pharmacy in some of the colleges of pharmacy, and more recently the fact that several colleges of pharmacy, in conjunction with various hospitals, are offering a master's degree in hospital pharmacy and related subjects. Assistance, in the form of fellowships and scholarships for such degrees, may be obtained through the American Foundation for Pharmaceutical Education. Most recently the VA has announced a plan of support for combined internships in VA hospitals to be supplemented by courses in nearby colleges of pharmacy, ultimately leading to the master's degree.

This growth in hospital pharmacy has not, however, been without the creation of, and the necessity to solve various problems. The management of a successful hospital pharmacy is not merely a matter of preparing pharmaceuticals, parenterals, compounding prescriptions, and taking care of stock and equipment. It goes beyond that. Not unlike the retail pharmacy, it involves economic, administrative and managerial responsibilities, as well as important considerations with regard to interdepartmental cooperation. Before discussing these matters, however, we would like to digress for a moment and consider the hospital pharmacy's background, a background which is in some respects unique.

A hospital pharmacy is, of course, an integral part of a hospital. A hospital, most commonly, is a corporate entity whose chief

function is to minister to the sick. More frequently it is set up as a non-profit enterprise. However, to carry out its functions it must have a source of income. Fees for medical services from patients generally are not adequate to cover all expenses. In this respect they are not unlike institutions of higher learning, which cannot be supported by tuition fees alone. Recourse must be had to other sources. This usually comes in part from governmental assistance, but much more from private contributions. The very least that can be said about such a means of income is that it is variable. Some of the things that hospital administrators say are unprintable.

A hospital is a complex organization consisting of a specialized plant, people of a great variety of skills, both specialized and general, and a multiplicity of services. Salaries have to be paid, plant has to be maintained, and materials and services have to be purchased. All of these have to be coordinated. And pervading the whole organization is the moral obligation of supplying the maximum of services to the alleviation of sickness and suffering.

How can this be done in the face of variable and uncertain income? What is the significance of a budget? To husband its resources so as to give the maximum of service to the sick a hospital must be managed on sound business principles, but not in such a way that strict balancing of the budget will tend to curtail or materially reduce those services for which a hospital was created. This last problem has been discussed and written about so much that it would be superfluous to consider it here. Suffice it to say, in the words of Gilbert and Sullivan, a superintendent's lot is not a happy one.

In the midst of this complex organization, and as an integral unit thereof, we find the hospital pharmacy. An integral unit whose function is to provide various types of medicinal preparations for both in- and out-patients. Yet it does not function independently. It functions through and with the cooperation of the medical staff, the surgical staff, the nursing staff, the administrative departments, and others. It has problems of internal and external control and cooperation. Equipment and materials must be purchased. Inventories must be maintained. Turnover ratios must be ascertained. Legal requirements with regard to narcotics, barbiturates and alcohol must be met. Pricing policies must be established. Depending on its management, the pharmacy can be an asset

or a liability. It is to the credit of the pharmacist to say that in most cases the hospital pharmacy is one of the few departments of a hospital that operate in the black.

All that we have said so far is chiefly by way of introduction. The integration of hospital pharmacy administration into the business management program, we believe, involves or is related to a newly emerging function of the colleges of pharmacy, or better yet an emerging broadening function of the colleges of pharmacy, in that of preparing students not only for the operation and management of a retail pharmacy. With the tremendous changes that have taken place in the practice of pharmacy many colleges, to a greater or lesser degree, have broadened their curriculum both on the graduate and undergraduate levels, designed to train students for hospital pharmacy, pharmacology, manufacturing pharmacy, pharmaceutical chemistry, detailing, etc. This trend will continue with time, until an entirely new concept of pharmacy teaching will crystallize.

It is not the purpose of this paper to go into a consideration of the exact form that the "crystal" will take, but to show how one aspect could be developed within the framework of the existing course of study.

One of the recommendations of The Pharmaceutical Survey was that by 1952 all of the colleges of pharmacy should have a business management department. Most of the colleges have already established such a department and, in many cases, have been functioning for several years, so that it would be a relatively simple matter to incorporate the suggestions that we are making.

The pharmacy business management program is specifically designed to acquaint the student with those principles of retail business management together with some principles of marketing, so that eventually, as retail pharmacists, they could manage their businesses more efficiently and successfully. The business management course of study may be divided broadly into two aspects. Those specifically concerned with internal management control measures and merchandising procedures. The former involves such subjects as form of business organization, purchasing and financing a store, departmentalization and layout, financial control and budgeting, buying the right kind and the correct amount of goods, inventory control, pricing policies both for general merchandise and prescriptions, legal obligations and responsibilities, etc. Merchandising pro-

cedures involves the techniques that are employed in inducing people to enter the store and make a purchase.

As has been stated above the successful operation of a hospital in general, and a hospital pharmacy in particular, requires the application of sound business principles. While a hospital pharmacy does not have the need for the application of promotional procedures, it certainly does have a need for the careful application of internal control measures. For just like a retail pharmacy, if poorly managed, it can become bogged down with too much inventory, or become messed up as the result of inefficient record keeping, or in a half dozen other ways.

A great wealth of information has been accumulated with regard to the internal control procedures that have been accepted as standard practice for hospital pharmacies. Many of these procedures are general and apply to all hospitals, while some of them are specific and apply to hospitals of certain sizes. Suffice it to say that these procedures differ from those of the operation of a retail pharmacy only in degree, but not in kind. It would constitute no great difficulty on the part of the business management teacher to show how the application of business management principles apply equally as well to the hospital pharmacy as it does to the retail pharmacy.

All that would be necessary would be for the instructor to acquaint himself with the information. And the information is available. The first step for the instructor would be a very thorough study of the hospital pharmacy syllabus prepared by the American Society of Hospital Pharmacists. This is available upon request. This syllabus contains some bibliography. A great deal of information can be obtained from the publications of the American Society of Hospital Pharmacists, the American Hospital Association, the American Public Health Association, and the United States Public Health Service. The standard text on hospital administration, which has valuable chapters on hospital pharmacy administration is MacEachern's *Hospital Organization and Management*.

There is an ever growing need for hospital pharmacists. The hospital pharmacists who have the responsibility of training juniors and internes have no trouble in breaking them into the pharmaceutical procedures, but have a great deal of difficulty with them on the administrative aspects. They ask, "Why can't the colleges do

something about it?" Our answer is that we can. Indeed, to some extent it is even our responsibility, for one of the functions of the colleges of pharmacy is to service pharmacy. And by broadening the course of study we will be rendering a service to hospital pharmacy and the student in particular, and to pharmacy in general.

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**President J. Hillis Miller** of the University of Florida should be declared the university administrator of the year of 1952 for his unique method of publicizing pharmacy. The first page of the football program in the Clemson vs. Florida contest of October 11, 1952, carries a letter from President Miller addressed to the alumni and friends of the University in which he calls attention to the cultural and general educational course for all students as well as professional training in certain fields. He then cites the contribution that the University is making in the pharmaceutical area as follows:

"In keeping with educational progress at the University, the curriculum of the college was revised. It includes cultural and foundational offerings and is designed to provide a systematic course of instruction in those subjects which are essential for the successful practice of pharmacy in drugstores and hospital pharmacies. The courses offer a foundation for additional study to qualify graduates for work in laboratories in the pharmaceutical, chemical, biological, and cosmetic industries, and also gives a necessary basis for sales work with wholesale and manufacturing pharmaceutical firms.

"Offering major work in pharmacy, pharmaceutical chemistry, pharmacology, and pharmacognosy, the graduate program of the College of Pharmacy has been well developed and now has the largest enrollment since it was started in 1925. Research work on many drugs has been of interest to the people of Florida and has resulted in the publication of over 200 scientific papers. Numerous grants-in-aid have been obtained from organizations and corporations."

The letter closes with a reference to the University's cooperation with the professions through its Bureau of Professional Relations which was organized in 1940 and which is partially supported by annual grants from the Florida State Board of Pharmacy. It has been an important factor in solving the mutual problems of pharmacists and physicians.

Following the page bearing the President's letter is a two page spread of fine pictures depicting various pharmaceutical processes being carried out in the pharmaceutical laboratories.

We all recognize the accomplishments of the Florida Bureau of Professional Relations but we owe much to President Miller for showing us a unique and dignified method of promoting public relations which is just as essential.—Ed.

## The President's Page

During the past five years or more, funds have been made available to provide extensive new facilities for pharmaceutical education. This includes new buildings completed or under construction, additions to existing buildings, extensive remodeling of old buildings, and equipment necessary to provide for modern teaching and research. In addition, a number of the member colleges of the Association have obtained newly equipped laboratories for the various departments of instruction. Moreover, a number of colleges have developed plans for new buildings and have been given a high priority on the building program of their respective parent institutions.

In order to gain an appreciation of the magnitude of this program, the following incomplete listing of new facilities is presented:

1. **New Buildings Completed:** Alabama Polytechnic Institute, Butler University, University of Connecticut, Drake University, University of New Mexico, University of Texas, and Texas Southern University.

2. **Parts of New Buildings Completed:** University of Arizona, University of Colorado, Ferris Institute, Howard College, Medical College of South Carolina, University of Michigan, St. John's University, and the University of South Carolina.

3. **New Buildings or Parts of New Buildings under Construction:** University of California, Howard University, University of Illinois, West Virginia, and the University of Wisconsin.

4. **Extensive Remodeling of Old Buildings Completed:** University of Georgia, University of Puerto Rico, State College of Washington, Temple University, and the University of Wyoming.

5. **Newly Equipped Laboratories for Departments of Instruction:**

(a). Pharmacology: University of Oklahoma, Rutgers University, and St. Louis College of Pharmacy.

(b). Pharmacy: Duquesne University, George Washington University, St. Louis College of Pharmacy, and Wayne University.

This incomplete listing represents more than forty-five per cent of the member colleges of the Association who have been given or will soon receive new facilities for pharmaceutical education. During the next several years it can be expected that substantially more than fifty per cent of the schools and colleges of pharmacy will have new facilities at their command. If pharmacy is to receive the maximum benefit from this multi-million-dollar investment in new facilities



for *professional education*, prompt attention needs to be given to the curriculum.

Pharmacy holds the unique but unenviable position of being the only one of the health professions requiring only four years of college education and not requiring pre-professional education as a basis for admission to the professional curriculum. The current draft regulations authorize the deferment of pharmacy students solely because they are classified as students in the "Healing Arts". On the other hand, it may be questioned whether or not the student can be certified on SSS Form 109 prior to having completed a pre-professional year of study, since this form is specifically devised for those students in the "Healing Arts" whose programs require pre-professional training.

The member schools and colleges will do well to avoid the temptation of adopting curricula on a basis of expediency and short-range planning. This has too frequently characterized pharmacy education in the past. If pharmacy is to accept its full responsibility as a major health profession, there can be no doubt as to the unqualified need for pre-professional education followed by a four-year professional curriculum. The new facilities that have been made available to many of the member colleges will make it possible for many, if not all, to develop professional education at this level, and they should be encouraged to do so.

T. C. DANIELS, *President*

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**The American Animal Health Pharmaceutical Association** has announced the discontinuance of its monthly bulletin, *The Animals' Healthmate*, with the December 1952 number. In its place, in January 1953, was released the first issue of *The Animals' Healthmate Journal*. The new publication is designed to serve all departments of the association's membership, the pharmacist, the animal product manufacturer, the drug wholesaler, and the sales representative by publishing information that will make for the advancement of animal and poultry health care. Through the medium of the journal the Association plans to build up a professional alignment with veterinary medicine comparable to that which exists in the fields of pharmacy and medicine. The policy of the journal will be governed by the executive committee of the Association and Dr. C. L. Campbell, the secretary of the Association, is the editorial director. The address is 5025 Pattison Ave., St. Louis 10, Missouri. The journal should become an important factor in the field of pharmaceutical journalism.



## The Editor's Page

*The Pharmaceutical Curriculum*, a report prepared for the Committee on Curriculum of the American Association of Colleges of Pharmacy by Lloyd E. Blauch, Ph.D., Associate Chief of Education in the Health Professions, Office of Education, Federal Security Agency, and George L. Webster, Professor of Chemistry, University of Illinois, should by this time be available to every one engaged in pharmaceutical education. If not, it is obtainable from the American Council on Education, 1785 Massachusetts Avenue, Washington 6, D. C., for the nominal sum of \$2. To try to build a modern pharmaceutical curriculum without a knowledge of what this report contains would be like trying to build a modern skyscraper without a solid foundation beneath it and the result would be just as chaotic and as disastrous.

In the January 1953 number of *The Journal*, Dr. Baluch, in an article entitled "The Report on the Pharmaceutical Curriculum," offers a number of suggestions as to the use that may be made of the report. He states the purpose of the report and how the faculties can make use of it. As to the latter point he urges that each individual faculty member study the report critically and familiarize himself with every part of it. The report was written as an integrated unit; the parts hang together, and each depends upon the others. It is essential that each individual have a grasp of all the problems involved. After this has been done the faculty should hold meetings and discuss the report collectively. He suggests further that the substance of the report should be considered in the general sessions of the A.A.C.P. and in the various sections of the Conference of Teachers. Finally the Committee on Curriculum should make a study of what use is being made of the Report by the various colleges and report the findings at the annual meetings.

In the same number of *The Journal*, President Daniels calls attention to the fact that "The schools and colleges now have at their disposal the most comprehensive and constructive report that has ever been made on the pharmaceutical curriculum, and it has been recommended that the Committee on Curriculum obtain a statement from each member college as to what we the faculty is making of

the report. We must not lay it aside, and I urge every member college to re-examine its educational program, its objectives, courses and curriculum in relation to the information, conclusions and suggestions presented in the report of the Committee."

Dr. Blanch says in closing his paper, "All of this is written in the hope that *The Pharmaceutical Curriculum* will not presently be laid on the shelf and forgotten but that it will be studied and used until the maximum benefit will be obtained from it."

This hope of Dr. Blanch and the admonition of President Daniels reminded the writer that it took a number of years following the Commonwealth Fund study of the function of the pharmacist, so ably directed by Dr. W. W. Charters, before the rank and file of pharmaceutical educators realized the significance of that study. This was due in part to the fact that the study, because of financial reasons, had to be limited in scope to the professional area; in part to the fact that some men who thought they should have been included in the advisory committee, were not; and in part to the fact that some men did not want to see a method of investigation that had been used in the discovery of the needs of industry applied to the discovering of the professional activities of the pharmacist.

It is amazing how intelligent and educated men who should excell in thinking can be so puerile in their acting. However, I have observed the same phenomenon in the two universities of which I have been a part and strangely it occurs even on the graduate school level.

The Commonwealth study showed the necessity of a four-year program for pharmaceutical education but it took a war to anchor it. It will be catastrophic if we do not at once take advantage of the service rendered to pharmacy by *The Pharmaceutical Survey*.

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Pharmaceutical educators are not the only group that is undergoing the agonizing pains of curriculum reconstruction. For those who want to get a complete grasp of the problems involved in education in the health sciences, they should read "Medical Education in Transition" by Dr. George Packer Berry, in the March 1953 (Vol. 28, No. 3, pp. 17-42) number of the *Journal of Medical Education*. Dr. Berry is the immediate Past President of the Association of American Medical Colleges, is Professor of Bacteriology and Dean of Harvard Medical School. The article is an elaboration of

his presidential address before the 1952 annual meeting of the Association in Colorado Springs in December 1952.

Dr. Berry calls attention to the tremendous changes that have taken place in medical education since the appearance of the Flexner report in 1910 but in spite of the educational program he declares "something is missing" and says, "If we are to serve society in the best way, our elaborate curriculum must be reconstructed, for as it is now constituted it does not permit today's student to become tomorrow's physician as we envision him." Furthermore, this transitional period in curriculum building comes at a time when the public is demanding good health as its right. If the curriculum is to be built to satisfy this demand it is up to us to do it, otherwise it will be done by those less capable. Dr. Berry describes experiments which are being carried on toward the attainment of this end. He mentions and describes briefly those being conducted at Harvard, Western Reserve, Colorado, Tennessee, in Boston, and Pennsylvania.

As a result of it all, the Association's Executive Council established in 1951 a Committee on Planning for Teaching Institutes. The Committee has so far planned six annual Teaching Institutes in which the effort will be focused on six concrete and circumscribed areas as follows:

1. Physiology, Biochemistry and Pharmacology.
2. Pathology, Microbiology, Immunology and Genetia.
3. Anatomy, Histology, Embryology, and Anthropology.
4. Medical Ecology.
5. Clinical Teaching including the Internship.
6. Special Training and the Continuing Education of the Physician.

It is impossible in a brief statement to point out the comprehensiveness of Dr. Berry's monograph on medical education, if I may so speak of it. The problem he discusses is our problem also. As a matter of fact he includes in his discussion the whole field of medicine and public health. Any one who does not read it is the loser. The horse and buggy days of pharmaceutical education are over. It is time for all of us to come to that understanding.

In a recent letter from Dean Karl L. Kaufman he asks the question, "Why should not ethics for the pharmacy student be made a part of one of the Summer Seminars for Teachers?"

The Editor approves. It is a subject of major importance and because of that it might be the only subject discussed. It might include some specific problems such as "Is it ethical and in keeping with the dignity of pharmacy to dispense beverage liquors from a public health institution?" This question of ethics might well be a subject for discussion in the District meetings of Boards and Colleges.

The beloved and ever versatile Dr. Edward C. Elliott, who served pharmacy well as Director of The Pharmaceutical Survey, has been appointed Educational Adviser to the Commanding General of the Ordnance Command. He is now on duty at the Aberdeen Proving Ground in Maryland, and will be actively engaged for the next three or four months at Aberdeen and the other training centers maintained by the Ordnance Corps. Then, where will the next horizon be?

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Eli Lilly and Company recently made a grant to the University of Vermont. The grant will support Dr. John E. Little, of the University's department of agricultural biochemistry, in his work on the isolation from plants of a substance having antibiotic activity. Dr. John E. Little is the son of our own Dr. and Mrs. Ernest Little of Rutgers University.

Here is hoping that some day the University of Vermont may have a college of pharmacy. The Editor, against the possible superior wisdom of his friends, still holds that every state needs a college of pharmacy and the profession within each state needs it. That has been abundantly proven by the experiences of those states where a college of pharmacy has been recently established as a part of the state's educational system.

RUFUS A. LYMAN

## Gleanings from the Editor's Mail

Dear Editor:

Although we have a pre-pharmacy requirement here at Purdue, it is in reality only a separation of the freshman year from the school of pharmacy. Ours is still a four-year course and, therefore has no bearing, in my opinion upon the effect of a pre-pharmacy requirement upon graduate programs. Our pre-pharmacy year includes two semesters of general chemistry, two of biology, two of mathematics, one of English, one of speech, and two of elective subjects such as sociology, psychology, government, history or economics. A pre-pharmacy requirement of two years followed by three professional years might have an effect on graduate enrollment but this, I think, will be impossible to determine as there are so many variables involved. I don't think this would be a profitable field for study as it will at this time consist only of arbitrary opinions of individuals. In the late fifties as Ohio State, Southern California, Oregon State and others begin producing graduates from five and six-year programs we will see the actual effects on graduate programs although these effects will be a resultant, not only of the prior educational program but also of the then existing economic and national and international political situations.

Two very definite advantages of our one and three set-up here at Purdue which is now in its third year of operation are evident. First, we are able to select for admission to the school of pharmacy only those students who have demonstrated some ability to do successful college work. We can see already a decided improvement in the scholastic caliber of our present junior and sophomore classes. Secondly, our students are more mature by one year when they begin the study of the more applied subjects in the sophomore year and more of them study the courses with a view toward retention for use in later professional life rather than with the objective of "passing" courses with only incidental retention.

Purdue University  
March 14, 1952

G. E. Cwalina

Dear Editor:

The matter I wish to call to your attention concerns the teaching of pharmacology in schools of pharmacy. As one who has been closely allied to this field, you know that this area of instruction is barely emerging from its infancy as far as schools of pharmacy are concerned. The problem is, how are we to hasten the growth of this child in the schools of pharmacy so that our teaching in this field will be on the level of medical schools?

Last summer during the Pharmacology Seminar held at Purdue University I presented the idea during the course of a meeting that I could see no reason why the pharmacologists in schools of pharmacy should not band together to form a group for the purpose of exchanging information relative to teaching methods, laboratory experiments, and research in schools of pharmacy.

As you know, the pharmacognosists have held the Plant Science Seminar each year, during which time the problems of their field are discussed at length and contributions are made which make those attending feel the meeting worth while. It seems to me that the American Association of Colleges of Pharmacy should recognize this problem and help in the establishment of an organization devoted to pharmacological problems. Several of the teachers of pharmacology in schools of pharmacy have expressed a willingness to become active in such an organization and I am sure it would be extremely valuable.

A second thought strikes me as being worthy of bringing to the attention of the Association. At present available fellowships, assistantships, research grants, etc., are announced in the schools of pharmacy through the medium of one dean's writing another dean and asking that the information be posted on the bulletin board of his institution. It seems to me that the AACP could do a service in this area by acting as a **clearing house** and centralizing much superfluous posting and writing. These announcements could be sent to the clearing house and periodically the association could release this information to all member colleges at one time.

St. Louis College of Pharmacy  
and Allied Sciences  
April 15, 1952

Arthur G. Zupko,  
Department of Physiology and  
Pharmacology

Dear Editor:

I am suggesting that I believe the establishment, by the AACP, of a Permanent Committee on Grants, Fellowships, Assistantships and Other Research Funds would be a worthwhile activity of the Association.

The aim of such a committee would be to secure and distribute information concerning funds from such organizations as the American Cancer Society, the National Foundation for Infantile Paralysis, Inc., Rockefeller Foundation, and government and private sources. These organizations make grants to departments of botany, zoology, physiology, pharmacology, etc., as well as to medical schools.

As to the Committee membership, although there are certain inherent advantages to a small committee, it might be desirable to include representation of the various pharmaceutical groups and then designate one member to function as chairman or director.

For example, there should be an Educational Group which would collect data concerning fellowships, scholarships and assistantships available at member colleges.

An Industrial Group. This group would be responsible for grants provided by industry. It would include such organizations as the American Pharmaceutical Manufacturers Association, Proprietary Association and the American Drug Manufacturers Association.

An Organization Group which would serve in an advisory capacity and endeavor to secure active support from their respective organizations such as the American Pharmaceutical Association, the National Association of Retail Druggists and the American Medical Association. Also from private organizations such as the American Cancer Society.

A Government Group, such as the U.S. Public Health Service, the Atomic Energy Commission, Departments of the Army, Navy and Air Force and various federal agencies.

The committee membership selections should be made by the officers of the AACP and with the advice of other organizations promoting the committee.

St. Louis College of Pharmacy  
and Allied Sciences  
May 28, 1952

Frank L. Mercer,  
Department of Biology and  
Pharmacognosy

Dear Editor:

I have just returned from Houston, Texas, where I represented the American Association of Colleges of Pharmacy at the dedication of the new building of the School of Pharmacy of Texas Southern University, on Sunday, October 12.

I was met at the airport by Prof. William B. Harrell, who took me first to my hotel. We were joined there by Dean Henry M. Burlage, of the University of Texas, who accompanied us to the campus of Texas Southern University, where we arrived shortly before the hour of four o'clock when the ceremonies were scheduled to begin. Three separate programs had been arranged, to follow in consecutive order. There were the ground-breaking ceremonies for a dormitory and student activities building, a most generous gift to Texas Southern University; the Annual Convocation Program; and the formal dedication of the Pharmacy Building.

It was a warm, sunshiny afternoon and the academic procession, led by the University Band of Texas Southern University made a colorful picture as it marched from the ground-breaking site to the beautiful auditorium on the university campus. After an organ prelude, a hymn, the reading of scripture and invocation, Dr. W. R. Banks, Chairman of the Board of Directors of Texas Southern University presented Chancellor James P. Hart, of the University of Texas, who in turn presented the principal speaker for the convocation, Dr. D. K. Woodward, Chair-



man of the Board of Regents of the University of Texas. Greetings from the Governor of Texas were extended by Mr. James A. Lands, of the State Board of Control, and from the American Pharmaceutical Association by President R. Q. Richards. Following the benediction and the academic recessional, the audience gathered at the main entrance of the new pharmacy building for the formal dedication ceremonies.

By this time, the evening shadows had darkened and the program was carried out by the use of large flood-lights, which illuminated the entire area.

After a dedicatory prayer by the Reverend I. B. Loud, member of the Board of Directors of Texas Southern University, the ceremony of presentation of the keys to the building was carried out. Those participating were Mr. H. A. Lott, representing the Contractor, Mr. Claude R. Cato, representing the Architect, Mr. Mark H. Hannah, Jr., representing the Board of Directors, Dr. R. O'Hara Lanier, President, representing the Texas Southern University and Dean Hurd M. Jones, Jr., representing the School of Pharmacy.

After brief remarks from Mr. Leon L. Kahanek, representing the Texas State Board of Pharmacy and myself, representing the American Association of Colleges of Pharmacy, the cutting of the ribbon was carried out by a committee of sixteen dignitaries and friends of the School of Pharmacy, and the building was officially opened for inspection.

The entire program for the afternoon, from the beginning to end, was most impressive and characterized by its dignity. The convocation was very well attended and I estimated that at least 600 were present at the dedication ceremonies.

The new building is modern in every respect, and shows evidence of very careful planning. Maximum advantage has been taken of natural lighting through the use of continuous windows in all outer walls on both floor levels. The entire outer wall surface is equipped with venetian blinds throughout the building. The laboratories are well equipped. Although the building is not large, it is as modern as any I have seen.

The acquisition of this new and modern plant represents a significant forward step for the School of Pharmacy of Texas Southern University. I predict that this school, under the guidance of Dean Jones, will make a splendid contribution to pharmaceutical education, not only to members of the Negro race living in Texas, but to those located throughout the whole region of the Southwest and South.

Joseph B. Burt, Chairman  
Executive Committee

The University of Nebraska  
October 15, 1953

## Notes and News

**University of Arizona.**—On February 17, the Tucson Pharmaceutical Association and the student branch co-sponsored a dinner in honor of Dean Willis R. Brewer at El Conquistador Hotel. Dr. Thomas H. Bate, president of the Arizona Medical Society spoke on "The Part Pharmacy Plays in Promoting Better Community Health." Honored guests included President and Mrs. R. A. Harvill, Dr. and Mrs. Alfred Atkinson, Dr. Robert L. Nugent, Dean and Mrs. A. Louis Slonaker, members of the Arizona Board of Pharmacy, and officers of the Arizona Pharmaceutical Association.—Dean Brewer and several faculty members participated in a good will tour in February to Hermosilla, Sonora, Mexico, which was sponsored by the Arizona Pharmaceutical Association.—At the March meeting of the alumni chapter of Rho Chi, A. Martin Ronstadt, 1950, spoke on "Pharmacy in the Armed Forces." Later he spoke on his recent experiences in the Korean front lines before the student branch.—Dr. Albert Picchioni is teaching an extension course covering the new drugs on the market. The course, the first offered by extension by the college is open to members of the medical profession and related health fields as well as to practicing pharmacists.

**Brooklyn College of Pharmacy.**—Mr. Nicholas S. Gesoalde, a college trustee, was tendered a testimonial dinner on February 23 at the Waldorf Astoria in recognition of his great service to retail pharmacy over the past fifteen years. — Dr. William F. Morgan was honored by the alumni association for his forty years of service as a member of the pharmacy department. Also the students presented the college with an Eppenbach homogenizer and an electric autoclave, in his name.—The pharmacy department has initiated a system wherein senior students are trained to handle telephone calls, original and photostatic copies for proprietary preparations. In the telephone conversation, the student is questioned on the proprietaries with reference to medicinal use, incompatibilities and similar practical drugstore application. The department is also preparing a section of the laboratory for ophthalmic preparations. The student will be trained in sterilization by ultraviolet and autoclave methods; in pH control and isotonicity.

**Butler University.**—Dr. Donald Meyers has been elected chairman of the Membership Committee of the Butler University Sigma Xi Club.—The college of pharmacy is sponsoring a series of radio programs. The subject of the January program covered opportunities for pharmacists in the fields of pharmacognosy and pharmacology and the participants were Drs. Martin and Myers and Prof. Prettyman.— Dean K. L. Kaufman was the January program speaker at the Linton County Pharmacy Club. His topic was "American Pharmacy, Future Tense."—

The pharmacy library recently received a gift of several books from the Medico-Historical Collection of Dr. and Mrs. Edgar F. Kiser, of Indianapolis. They include herbals and other books on the history of plants, some of them dating back to the 16th century.—a dipping refractometer, a tablet machine, and other pieces of equipment for the manufacturing laboratory have been received recently.—Carolyn McClurg, a pharmacy junior was one of the twelve Butler University women recently honored by Theta Sigma Phi, national honorary society for women. Awards are made for participation in activities contributing to the university and for high scholastic honors.—The student branch held its first annual dance in February. The proceeds went to a scholarship recently established by the branch.—Dean Kaufman has been appointed chairman of a university committee preparing for the Regional Science Fair, one of six to be held in the state. The purpose of the Fair is to increase the number of secondary school students interested in the various fields of science and applied sciences.

**University of Colorado.**—The second Rocky Mountain Drug Conference was held in Denver in February and was attended by members of boards, state pharmaceutical associations, and colleges of pharmacy from the entire Rocky Mountain region.—Dean Charles F. Poe has been elected to serve as section chairman for the Bacteriology Section at the twenty-fourth annual meeting of the Academy of Science for Colorado-Wyoming to be held at Colorado College, Colorado Springs, in May.—Dr. Norman F. Witt, professor of pharmaceutical chemistry and chemistry, has been appointed chairman of the department of chemistry, College of Arts and Sciences, effective July 1, for a two year period.—Prof. Fred C. Armstrong represented the school at the annual Mid-West Drug Conference held in Kansas City, Missouri in January.—The college of pharmacy participated in the "Religion in Life Week" held on the campus in February by inviting two speakers to address the pharmacy students. Dr. Ward Darley, vice-president and director of the University of Colorado Medical Center and Dr. John Ammesse, and outstanding practicing physician in Denver, addressed the group on the responsibilities of a pharmacist to his profession and to the community in which he lives.—Dr. Edward D. Crabb, director of the Beta Sigma Phi Cancer Research Foundation of the University of Colorado, lately described his research work dealing with cancer studies on hamsters before the premedic and pharmacy students. The lecture was co-sponsored by Alpha Epsilon Delta, premedic honor society and by Rho Chi.—Dr. Edward R. Shepard of the Eli Lilly Company spoke recently before a meeting of graduate chemistry and pharmacy students on "Synthetic Curare Compounds."—Dr. Wayne Norman, ex-president of the Colorado Pharmacal Association, spoke in March before the pharmacy students on the general topic "Retail Pharmacy."

**University of Connecticut.**—Prof. and Mrs. N. W. Fenny, in March, accompanied 68 seniors on a visit to the Abbott Laboratories and the

Parke, Davis plant.—The main construction of the second wing of the new pharmacy building is complete and interior work is now progressing. The wing, which will make a complete pharmacy unit, will be ready for occupancy in September.

**Creighton University.**—Mr. Sebastian Pirruccello has been reelected assistant treasurer of the Creighton Federal Credit Union. He is also in charge of the clinic pharmacy maintained for out-patients attending the medical school clinic. He is assisted by senior pharmacy students as a part of their training in dispensing.—One hundred thirty-five students are registered for the second semester.—Dr. Clifton F. Lord, Jr., has been scheduling field trips for his students in hospital pharmacy. To date they have visited the Veterans Administration Hospital in Omaha and the Base Hospital at Offutt Field, the Army Strategic Air Command Base located a few miles south of Omaha. On February 9, Dr. Lord participated in the Creighton University TV program, "Doors of Knowledge." Assisted by two seniors, he explained for the benefit of non-professional viewers the problems and methods of pharmaceutical research as applied particularly to his Pharmaceutical Syrup Preservation research.—As a part of Creighton University's Diamond Jubilee in April, the college of pharmacy held open house and conducted various demonstrations in pharmacy, pharmacology, pharmaceutical chemistry and clinical pharmacy.

**Duquesne University.**—During the month of February, the alumni association conducted an Alumni College designed to bring to the alumni the latest information in certain fields of public interest. Four members of the pharmacy staff discussed the popular subjects: sleeping pills, chlorophyll, cosmetics and antibiotics.—Approximately 300 persons attended the Conference for Practicing Pharmacists which was held on March 4 and 5 as a part of the University's year-long Diamond Jubilee Celebration. The program was designed to bring to the attention of practicing pharmacists late information in several fields in which they should be interested. Dr. D. L. Tabern discussed radioisotopes in medicine and pharmacy and Dr. James C. Munch spoke on chlorophyll and its current status. A clinic on compounding procedures was conducted by members of the staff. President-Elect F. Royce Franzoni of the A.Ph.A., addressed the dinner which concluded the Conference on the topic, "What Now?".—The University development fund campaign for \$8,300,000 is now under way. Approximately \$300,000 will be allocated to pharmacy.

**University of Florida.**—At the mid-year commencement, Byron A. Barnes was awarded the Master of Science degree and is continuing work for the doctorate.—The doctorate was awarded to three candidates: Thadeus S. Grosieki, who is now teaching pharmacy at the University of Arkansas; Herbert M. Gross, now with the Lincoln Laboratories of Decatur, Illinois; and Henry D. Johnson, now teaching phar-

macology at the Southern College of Pharmacy at Atlanta, Georgia.—The Bureau of Professional Relations, in cooperation with the Public Relations Office of the University, set up an exhibit at the Florida State Fair at Tampa, giving over all emphasis on the University of Florida but featuring especially the proposed Medical Center and the College of Pharmacy. This exhibit was intended to acquaint the general public with the amount and the value of the medical and pharmaceutical research already done at the University.—On February 21, the Bureau of Professional Relations presented a telecast from Jacksonville, entitled, "Knowledge in Action" in which was described some of the changes in the profession and the college during its life time. The cast included Dr. W. J. Husa and Seldon D. Feurt of the faculty, and R. John Sanders and Bradley L. Dansby, Jr., of the student body.

**George Washington University.**—The third annual Career Conference of the University was held on February 25. The Pharmacy Section sponsored by the student council presented as the principal speakers President-Elect F. Royce Franzoni, of the American Pharmaceutical Association, Dr. Karl Bambach, vice-president and executive secretary of the American Drug Manufacturers Association, and Captain George Archambault of the United States Public Health Service.—The local chapter of Alpha Zeta Omega held a testimonial dinner on March 12, honoring Harold C. Kinner, secretary of the District of Columbia board of pharmacy.—The senior class recently visited the Upjohn and the Parke, Davis laboratories.

**University of Georgia.**—A 300 year old mortar and pestle, originally belonging to the Pearce family of New England in Colonial days, has been given to the school by Mrs. Edith L. Stallings, dean of women at the University. Hewn of wood and standing about eight inches high, this mortar and pestle pre-dates 1700. The mortar and pestle, commonly found in the old apothecary shops and symbols of modern day pharmacy, was once found in many homes where it was used for pounding or grinding grain and other material. For many years this set was on exhibit in the Essex Institute in Salem, Massachusetts. It was removed in 1925 and sent to Mrs. Stallings in compliance with the will of the owner, Rev. T. C. Langdale, her uncle. It was kept in her home until presented to the school for its display of pharmaceutical equipment.—Rho Chi sponsored Crawford W. Long Day on March 30. A program was held in the University of Georgia Chapel. Dr. Robert B. Greenblatt, professor of endocrinology at the Medical College of Georgia, was the speaker. His topic was "An Inquiry into the Origin and progress of Medicine." Immediately after the program the group went by car to Jefferson, Georgia, which was the site of the discovery of the anesthetic property of ether by Dr. Long. A ceremony was held there in tribute to the discoverer.—Three pharmacy students were honored recently by being selected for membership in the Phi Kappa Phi So-

ciety.—The fourth annual seminar, co-sponsored by the Georgia Pharmaceutical Association and the Division of General Extension of the University of Georgia and assisted by the Bibb County Pharmaceutical Association and the Sixth District Pharmaceutical Association, was held in Macon, Georgia on February 4. One hundred and fifty were in attendance. The first part of the program was a panel directed toward personnel development as the key to efficiency in which several men in industry and the audience participated. The second part was given over to prescription pricing. The discussion was led by Dr. J. P. LaRocca of the pharmacy staff.

**Howard College, Birmingham**—The Gamma Zeta Chapter of Kappa Psi published and mailed to the alumni the first edition of their news letter, *The Gabby Gamma*, in January.—The students, through organizational and independent gifts, purchased Venetian blinds for the entire facilities of the Division.—Permanent facilities to house animals for pharmacological studies have been provided in a spacious, well-lighted and ventilated room as a result of our new addition and remodeling activities.—Drs. A. H. Olive and Woodrow R. Byrum attended the first meeting of Alabama Hospital Pharmacists at the Druid City Hospital Library in Tuscaloosa, Alabama on January 24. Dr. Judson Dowling, chairman of the Druid City Pharmacy Committee, addressed the group on "How Pharmacy Can Best Serve the Medical Staff".—At the recent district meeting of the boards and colleges in Charleston, South Carolina, Dr. Byrum presented a paper entitled, "A Model State Board Examination in Pharmacology".

**Idaho State College**.—ROTC training has been added to the pharmacy curriculum as a requirement to the extent of 4 to 6 semester hours. A Chemical Warfare Unit was established on this campus last fall. It is possible to elect 16 semester hours of this training and qualify for a possible commission. In order to acquaint the citizens of the state with the college of pharmacy, every effort is made to present the students and faculty members in educational programs whenever an opportunity arises. During January and February of the current year, Dean E. E. Roscoe, Prof. Ivan Rowland and Dr. Carl Riedesel have appeared before service clubs, state pharmaceutical meetings and in lecture series sponsored by chambers of commerce.—Dr. Rufus A. Lyman, Jr., is teaching some of the classes in physiology this semester since the registration is too large for Dr. Riedesel to handle alone.—Several new pieces of equipment including a Van Slyke blood apparatus and a new colorimeter have been added to the physiological laboratory.—A new bacteriological laboratory has been made available this semester which enables the pathogenic laboratory to be used exclusively for that course and for clinical laboratory methods.—Mrs. Cisco Kihara, secretary and instructor in pharmacy, has been honored by having the Idaho State College year book "The Wickiup", dedicated to her.—Nephelometric and chromato-



graphic apparatus has been added to the equipment of the laboratories of analytical pharmacy.

**University of Illinois.**—Steel for the new East Dentistry-Medicine-Pharmacy building is now being delivered. Although there has been some delay, it is planned to occupy the building in the fall of 1954.—A survey of the instructional content of the various pharmacy courses has been conducted by the Committee on Examination Procedures and Methods under the chairmanship of Dr. A. J. Perkins. Six evenings have been devoted to this survey with the intent of setting up a plan of comprehensive examination crossing course lines. The entire teaching staff has cooperated in this study.

**State University of Iowa.**—Dean Louis C. Zopf represented the college and the A.A.C.P. at the December meeting of the American Association for the Advancement of Science in St. Louis in December. On January 5, he spoke before the Mt. Vernon Rotary Club on "Building Pharmaceutical Products".—Dean-Emeritus Wilber J. Teeters addressed the Cedar Rapids Druggists at their February meeting.—Prof. Robert L. Van Horne has been appointed to represent the college on the University Committee on Continuation Studies.—Prof. Gail A. Wiese has been appointed as pharmacy's representative on the University Council to succeed Dean Zopf who served on the Council for many years.—Allan D. Vestal, assistant professor of law has joined the pharmacy staff on a part time basis to give the senior students a series of ten lectures on pharmaceutical jurisprudence. His lectures deal with legal problems as they concern the individual in any business operation. Federal and state laws pertaining to the purchase and dispensing of drugs are not included in this lecture series.—On March 8 several members of the faculty took part on a Davenport, Iowa, television program. The panel reviewed the program leading to the bachelor's degree and discussed the opportunities for such graduates and those having higher degrees.—Harvey J. Norgaard, president of the Iowa Pharmaceutical Association, addressed the student branch recently, speaking of the opportunities, not only of professional service, but of opportunities to become leaders in community activities and the values arising from such activities.—The following members of the pharmacy staff have been elected to full membership in Sigma Xi: Henry F. Baumann, instructor in pharmacy and supervisor of manufacturing pharmacy; Wendle L. Kerr, instructor in pharmacy and chief station pharmacist, department of drug service; William W. Tester, instructor in pharmacy and head pharmacist, University Hospitals. Vishnu N. Bhatia, Ph.D., 1951, now assistant professor of pharmacy at Washington State College, was also elected to full membership. Graduate students James W. Conine and John R. Hohmann were elected to full, and Robert W. Goettsch to associate membership. Junior students Shirley A. Albrecht, Louis J. Bisinger, and Maurice W. Gintz, have been elected to membership in



**Rho Chi.**—The National council of Kappa Epsilon has announced that Marie T. Boruque, a senior in this college, made the highest grade (96.9) on the national examination given to all members of all chapters of the sorority. The average for the local chapter, Gamma, was 85.5.

**University of Kansas.**—Recent new equipment acquisitions include an Abbe refractometer and an automatic titrating unit. The latter is being put to use in the analyzing of student preparations as part of a program to stimulate greater care and accuracy in compounding.—Dr. C. F. Peterson presented three papers before the Pharmacy Subsection of the American Association for the Advancement of Science at the December meeting in St. Louis.—A new one credit hour course was instituted at the beginning of the second semester.—Drs. Burckhalter and Wenzel accompanied a group of twenty-five students on a tour of the Parke-Davis Company plant between semesters.

**University of Kansas City.**—Dean T. T. Dittrich presented two papers before the March meeting of District No. 6, Boards and Colleges at St. Louis.—Thirty-nine students visited the Eli Lilly Company plant in March.—Lewis Schanker who recently received the master's degree with pharmacology as a major, has been awarded a Wisconsin Alumni Research Foundation Assistantship at the University of Wisconsin and will continue graduate work there.

**University of Maryland.**—Dean Noel E. Foss and Dr. C. T. Ichniowski represented the school of pharmacy and Dr. L. M. Kantner and Charles S. Austin represented the Maryland board of pharmacy at the annual meeting of District No. 2 at Albany, New York, on March 1-3.—Dr. Ichniowski presented a paper entitled "A Step-Wise Integration of a Course in Pathology in a Four-Year Program"; Dr. Kantner was a member of a panel discussion on "Substitutions and Imitations"; and Dr. Swain addressed the group on the subject, "Does Pharmaceutical Education Need a Public Relations Program?".—The 1953 meeting of the National Alumni Association of the Baltimore College of Dental Surgery.—The Dental School of the University of Maryland, was held at the Lord Baltimore Hotel on March 4, 5 and 6, 1953. Dean Noel E. Foss was the luncheon speaker on the last day. His subject was, "Inter-professional Relations of Dentists and Pharmacists".

**University of Michigan.**—Dr. A. M. Mattocks, formerly director of pharmaceutical development at McNeil Laboratories, joined the staff in January. He will teach the undergraduate courses in manufacturing pharmacy and will supervise graduate work in the field of pharmaceutical development. Two fellowships for graduate work in this field have been established recently by Parke, Davis and Company.—As a part of the course in dispensing pharmacy, the seniors are spending one-half day per week at the University Hospital Pharmacy under the supervision of Dr. Warren E. McConnell who joined the faculty in September, 1952 as assistant professor of pharmacy.

**University of Minnesota.**—Enrollment at the beginning of the winter quarter, 1953, was 266 undergraduate and 16 graduate students.—On the evening of January 26, the faculty of the college and the board of pharmacy of Minnesota held its annual conference at the Hotel Nicollet.—Dr. F. I. DiGangi was called to Patterson, New Jersey, on March 2, by the death of his brother.

**University of Mississippi.**—The enrollment for the second semester totals 114. There are five women and thirty-two of the men are veterans. There are thirty-five pre-pharmacy students registered in liberal arts.—Drs. John L. Voight and E. L. Hammond attended the meetings of District No. 3 at Charleston, South Carolina in February.—The class in history and literature was shown a film recently on the history and development of DuPont, and an audio-visual film covering the production and refining of sugar in the United States.—Patricia Carolyn McNease, at present a pharmacy senior, has won the honor of having her name inscribed on the Kappa Psi bronze scholastic award plaque for having obtained the highest average of any pharmacy junior last year.—During the first semester, five pharmacy students made the Honor Roll of the University. Seven students have been initiated into Beta Rho Chapter of Kappa Psi.

**Montana State University.**—Dean Jack E. Orr attended the Rocky Mountain Drug Conference meeting in Denver during February. He was elected first vice-president of the group.—Dr. Muriel Laran's cancer research grant has been renewed for the current year. Dr. Laran has her equipment in order and is undertaking the separation and identification of the components of Podophyllum resin possessing the inhibitory effect on the multiplication of cancer cells.—An educational and social meeting of the student branch was sponsored recently by the Upjohn Company. J. A. S. Rodds and Mr. Cheesman of Spokane addressed the group on the therapy of Heparin.—George Gosman, 1916, a prominent pharmacist of Dillon, Montana, was elected lieutenant governor of the state at the November, 1952 election. On February 17, Mr. Gosman was feature speaker at the dedication of a new \$634,000 men's dormitory on the university campus.—The **Montana Pharmacist** quarterly news bulletin of the school of pharmacy, is now printed in newsletter semi-tabloid form by the university's school of journalism.

**University of Nebraska.**—Dr. LaVerne D. Small accompanied forty juniors and seniors on an educational tour of the Abbott Laboratories and the Eli Lilly plant during the week of March 9.—Dr. Samll has been appointed by the University Research Council to full-time research duty during the summer of 1953, for the purpose of developing a series of sulfur-containing derivatives closely related to "Promin".—Leonard Nelson, instructor in physiology, has received from the University Research Council a grant-in-aid in support of research work he will carry on in the summer of 1953 at Wood's Hole Marine Biological Laboratory.—The Rho Chi chapters at Nebraska and at Creighton Universities

have developed plans for a presentation to be offered jointly by two groups at the annual convention of the Nebraska Pharmaceutical Association to be held in April in Lincoln.—Daniel F. Moravec, chief pharmacist at the Lincoln General Hospital, was the guest speaker at the February meeting of the local branch. His topic was "Hospital Pharmacy as I See it". He also commented on the new formulary which has been adopted by the Nebraska Medical Association.—Dean and Mrs. J. B. Burt attended the Midwest Conference of Pharmaceutical Associations held in Kansas City, Missouri, January 17-18.—Dean Burt and Dean Emeritus R. A. Lyman attended the interim meeting of the Executive Committee of the AACP in Chicago on January 22-24. The Executive Committee also held a joint session with the American Council on Pharmaceutical Education on January 23.

**New England College of Pharmacy.**—The fall enrollment was 269.—Recent appointments to the faculty are: Dr. Albert J. Ensebi, Ph.D., Fordham University, to the department of chemistry. He was formerly on the staff of Georgetown University. He teaches organic and biological chemistry; Mr. James Inashima, professor of pharmacology. He received the B.S. from Idaho State College of Pharmacy, the M.S. from the Philadelphia College of Pharmacy and Science, and is a candidate for the doctorate this spring from the Jefferson Medical College. He is chairman of the department of biological sciences; Dr. Herbert C. Raubenheimer, formerly on the faculty of St. John's University, joins the faculty as professor of pharmacy and adviser to the student branch; Mr. Mitsuru J. Nakamura, A.B., University of California, M.S., from University of Southern California, is presently working toward the doctorate at Boston University and is now assistant professor of microbiology and biochemistry and chairman of the research committee.—Assistant Dean Sigurdur Jonsson accompanied the senior class on their recent trip to the Eli Lilly and the Parke, Davis plants.—Hr. Harold C. Hodge, chairman of the department of pharmacology of Rochester University spoke recently to the senior class on the effects of the atomic bomb. After discussing the different types of detonation, he stressed the need for preparedness in case of atomic bombing and concluded his lecture with the fervent hope that the atom bomb would never again be used.

**University of New Mexico.**—The organization meeting of the College of Pharmacy Council was held on February 1. The Council is composed of the faculty, one student and eight representatives of the drug industry in the state.—Dean Cataline and Dr. H. C. Ferguson attended the "Doctor, Dentist, and Druggist" meeting recently in Gallup to show and comment on the film, "Chronic Barbiturate Intoxication".—Dean Cataline and Dr. J. E. McDavid attended the "Rocky Mountain Drug Conference" in Denver in February.—David D. Stiles of the Abbott Laboratories addressed the senior class recently on the results of the nation wide prescription survey he is conducting.—The total enrollment in the

spring semester is 89.—Twelve students made the "Deans' Honor Roll" last semester.—Five students were recipients of American Foundation for Education Scholarships and two students were granted freshman scholarships.

**University of North Carolina.**—For the first time since 1941, no professional pharmacy courses will be offered in the 1953 summer session.—In compliance with recommendation of the trustees, the University is converting to the semester system, effective in September 1953.—The Jenkins and Hartung "Chemistry of Organic Medicinal Products" has been translated into Spanish.—At its seventh annual meeting in February, the Board of Directors of the North Carolina Pharmaceutical Research Foundation, Inc., increased its membership from twelve to twenty-four. The Foundation is offering eight graduate fellowships for the next academic year.—Dean E. A. Brecht is conducting an evening course in first aid for physical education majors and Alpha Phi Omega (service fraternity). The course is sponsored by the American Red Cross.—Prof Hammerness is supporting his course in drugstore accounting by critical study and class use of Lilly's Accounting and Record System for the Retail Drug Store".

**Ohio Northern University.**—The school was re-examined early in April by the American Council on Pharmaceutical Education.—New openings on the staff are available in the areas of pharmaceutical administration and pharmacognosy. A person qualified to teach both bacteriology and pharmacy subjects is needed. Each applicant should be a pharmacist or hold a pharmacy degree.—Several thousand dollars worth of new equipment has been acquired, "slim-line" lights are being installed, the building has been redecorated and repainted and other changes are being planned.—A new outline for the four-year course is being made which will give the students a broader general education without lowering the professional standard. The new program is being planned so that on the adoption of the five year plan it can readily be modified to meet all requirements.

**Ohio State University.**—Dr. Earl P. Guth spoke to the members of the Columbus Academy of Ophthalmology and Otolaryngology on the subject "Eye, Ear, Nose, and Throat Medication" at the University Club on October 6. Dean B. V. Christensen, during the month of January, attended a meeting of the Council of the American Pharmaceutical Association in Baltimore, the dedication of the Kelly Memorial at the University of Maryland, and a meeting of the American Council on Pharmaceutical Education in Chicago. In March he served as a member of the Committee of the Council inspecting the Southern College of Pharmacy in Atlanta and the Division of Pharmacy, Howard College, Birmingham, Alabama.—Dr. Ivor Griffith, Philadelphia College of Pharmacy and Science, was the principal speaker at a pharmacy students dinner held in conjunction with Religion in Life Week. He also spoke at a convocation sponsored by the College of Pharmacy and the College of Veterinary

**Medicine.**—Dr. Justin L. Powers, Editor of the Scientific Edition of the Journal of the American Pharmaceutical Association, received the Phi Delta Chi award at the Professional Interfraternity Council on February 25.—Dr. E. V. Lynn, director of research, Massachusetts College of Pharmacy, was the guest and principal speaker at the Rho Chi dinner meeting held in the Ohio Union on March 5. He also gave a special address to the pharmacy graduate students.—Dr. Patrick Belasco, Ph.D., Purdue, joined the pharmacy staff as an assistant professor at the beginning of the winter quarter.—Dr. Jack L. Beal, Ph.D., Ohio State, became a member of the pharmacy staff at the opening of the autumn quarter as assistant professor of pharmacognosy. He replaces Dr. A. B. Colby who resigned his teaching position and now operates the Colby Pharmacy in Middleton, Wisconsin.—Dr. Michael Clay who received the doctorate in pharmacology on March 20, has accepted and assistant professorship in pharmacology at Columbia University, effective September 1, 1953. At present he is engaged on a special research project on the adrenocorticotrophic factors which will be continued through the summer at Wood's Hole, Massachusetts.

**University of Oklahoma.**—The more than 4000 volumes in the pharmacy library have been rearranged so that it is now an open-shelf library and is proving to be very satisfactory to both students and faculty.—One hundred and thirty pharmacists, company representatives and students attended the third annual pharmacy alumni seminar held at the University in February. A fourth seminar is being planned for next year.—Dr. John B. Bruce addressed the Mid-year Conference of the American College of Apothecaries held in Oklahoma City on February 22. His subject was "Principles and Techniques of Ophthalmic Prescriptions".—Dean Ralph W. Clark has accepted an invitation to take part in the Walgreen Seminar in Drug Store Management in June.—During the meetings of the American College of Apothecaries, Dr. Paul C. Olsen, director of marketing for "Drug Topics", addressed the students on the subject of "Trends in the Profession of Pharmacy", and Mr. R. T. Sanner, assistant manager of trade relations for Parke, Davis and Company, spoke on the subject of "Intra-Professional Understanding".—Dean Clark has lately addressed service clubs, highschool teachers associations, and high school science classes throughout the state on the subject of "Drugs", attempting to develop a better understanding of the meaning of the term, which in many cases is misunderstood. Considerable interest is shown in a forthright discussion of the values, the dangers and the need of control of the sale of drugs and narcotics. He also spoke on the "Geography of Drugs" at a meeting of Gamma Theta Epsilon, honorary geography society, on March 2.

**Oregon State College.**—Prof. Fred Grill gave the first lecture of the Turnbull Memorial Lecture Series in Vancouver, Canada, on February 20. The objective of the Turnbull Lectures is to stimulate interest in the study of the fields touching on pharmaceutical economics and

merchandising. The first lecture followed the annual dinner of the Greater Vancouver Druggist's Association.—The winter seminar was held in the pharmacy building on February 13. The program consisted of the following presentations: Gamma Globulin by Dean George E. Crossen; Antibiotics by Prof. Fred Grill; and Isotopes by Prof. Herman C. Forsland.

**Philadelphia College of Pharmacy and Science.**—The college celebrated the 132nd anniversary of its founding by two special observances, a formal convocation on February 23, and an alumni banquet on February 28. At the convocation, honorary degrees of Master of Science were conferred upon Jacob Katz, chairman of the Pennsylvania Board of Pharmacy and F. Royce Franzoni, president-elect of the American Pharmaceutical Association. The principal speaker was Dr. Theodore Klumph, president of Winthrop-Stearns Company. President Brua C. Goodhart of the alumni association was toastmaster at the alumni banquet and Edson Woodward, executive secretary to the president of the S. B. Penick Company, illustrated with colored slides his journeys through Europe, Africa, Mexico and Central America in search of new sources of the drug cortisone.—The College of Pharmacy and Science, the Jefferson Medical College of Philadelphia and the Jefferson Medical College Hospital will again offer a cooperative program of graduate study and internship in hospital pharmacy beginning with the fall term, 1953. A limited number of recent graduates will be accepted for the academic and non-academic internships. Graduates will be eligible for directors or chiefs of pharmacy services in hospitals. The program for the academic internships involves about 22 months. A minimum of 26 semester hours of course work is required, to be taken concurrently with service for a minimum of 2400 hours as an intern in pharmacy at the Jefferson Hospital. At the completion of the course the masters degree will be awarded by the College and a certificate of service as an intern in pharmacy will be awarded by the Jefferson Medical College Hospital. The program for the non-academic internship involves about 15 months beginning July 1, 1953. The intern is required to take the course in pharmacology as offered at the Jefferson Medical College. 2400 hours of service in the hospital pharmacy is required, on a basis of a 48 hour week of six eight hour days. In both types of internships the intern receives an honorarium of \$100 per month. For further details, address the College.—Drs. Martin Barr and Floyd Tompkins spoke at a seminar in WilkesBarre on February 13. Dr. Benjamin M. Duggers of the Lederle Laboratories, discoverer of aureomycin, gave the Julius W. Sturmer Memorial Lecture following the annual Rho Chi dinner on March 25.

**University of Pittsburgh.**—Joseph D. McEvilla, instructor in pharmacy administration, has accepted an invitation to participate in a new annual seminar sponsored by the Walgreen Company in cooperation with leading colleges of pharmacy. The seminar in drug store management



will be the first of its kind in the drug field and will offer participants a comprehensive on-the-scenes study into all phases of drug store operation. The six weeks course which will be held at the firm's Chicago headquarters June 22-July 29 will be attended by representatives from twelve important colleges and universities. Work will include extensive coverage of techniques in modern store management, plus field trips into Walgreen stores and other facilities. The main purpose of the seminar is to bring actual field experience into the classroom in preparing pharmacy students for successful drugstore management. In addition, however, the exchange of information and ideas between faculty members and executives is expected to be mutually helpful and stimulating.

The celebration this year of the founding of the University of Pittsburgh School of Pharmacy, as the Pittsburgh College of Pharmacy, 75 years ago, was continued during the month of March by a joint project of the Pitt Pharmacy alumni, faculty, and students.—From March 1, to March 15, an exhibit was staged in the South Gallery of the Buhl Planetarium and Institute of Popular Science from 1 to 10:30 P.M., weekdays and Sundays. This exhibit was known locally as Pharmacy Career Week and comprised an overall effort to present pharmacy to the public. The Buhl Planetarium in Pittsburgh is much interested in furthering the cause of science among young people, and their showings are attended by junior and senior high-school students from all over Allegheny County. In accordance with their policies, 2,100 schools in the area were notified of this pharmacy exhibit. The pharmacy school exhibit at the Planetarium included demonstrations by the students, exhibits from some of the leading pharmaceutical manufacturers, and a showing at regular intervals of the school's color slide film, "Pharmacy at Pitt." The gallery was decorated with prints taken from the famous "History of Pharmacy" pictures of Parke, Davis & Company, and mortars and pestles from the Yagel collection. Two show globes, loaned by an alumnus, were also on display. Students gave demonstrations in the following techniques: making capsules, making powders; making emulsions—both by hand and by the use of the homogenizer; explaining microchemical tests for plant constituents; showing the soxhlet extraction process; and exhibiting the response of frogs to electrical stimulation. Manufacturers who participated included: Lederle Laboratories Division of American Cyanamid Company; Eli Lilly & Company; Schering Corporation; Sharp & Dohme, Inc.; E. R. Squibb & Sons; and Winthrop-Sterans, Inc. The Lederle exhibit gave oral and parenteral dosage information on Aureomycin, and its place in pharmacy and medicine. Lilly showed eighteen panels depicting ancient and modern concepts of therapy in diabetes. The Schering Corporation display showed hormonal substances and pharmaceuticals, and included a booklet on the Pharmaceutical Industry. Sharp & Dohme's "Lyovac Plasma" was the subject of this company's display, while Squibb had a panel display on penicillin manufacturing, with twelve steps actually shown, depicting



the process from penicillin broth through to the finished penicillin crystals. Winthrop-Stearns sent a panel display of the story of amebiasis, illustrating the life cycle in man—the transmission, pathology, and diagnosis. There was also a display of rare and exotic perfume vials—Ylang Ylang, English Liliac, Maid of the Mist, Marsh Rose, Tea Rose, Heliotrope, and New Mown Hay. These were also from the private collection of Louis Yagle, formerly an instructor at the school, and now operator of a retail pharmacy in Pittsburgh. The Buhl Planetarium project, Pharmacy Career Exhibits, has been brought to the attention of the public radio, newspaper, and television. A radio program on Tuesday, March 3, featured Dr. Stephen Wilson, vice dean, and several students; and another on Tuesday, March 10, featured Dean Edward C. Reif, Elder Stein, president of the Pharmacy unit of the Alumni Association, and Raymond Dessy, senior student in the school of pharmacy. A television program on Wednesday, March 10, "Pitt Parade", featured both faculty and students. A portrayal of the opportunities and responsibilities of a pharmacist in modern society was the aim of this presentation of the study and practice of pharmacy.

**Purdue University.**—Donald W. Harding who was recalled to active duty with the Army in July 1951 and served as a First Lieutenant in Germany for over fourteen of his sixteen months tour of duty, has returned to resume his duties as assistant professor of pharmacy and director of the pharmacy extension department.—Patrick E. Belcastro, Ph.D. '53, has accepted a research position in the biological division of Eli Lilly and Company.—Ajit Datta, M.S., has been appointed to an assistantship at the University of California, San Francisco.—Harold Sheinaus, a graduate assistant the first semester, now holds a Purdue Research Foundation fellowship.—Allen V. R. Beck, now chief pharmacist of the Indiana University Medical Center in Indianapolis has been elected president of the American Society of Hospital Pharmacists for 1953-54.—At the January commencement, eight seniors were granted the bachelor's degree; Herbert H. Adams and Eugene E. Hamlow received the master's, and the doctorate was conferred upon Patrick F. Belcastro, Warren M. McConnell, and Walter E. Wright.

**Rutgers University.**—On February 3, the college of pharmacy inaugurated a Hospital Pharmacy Administration Workshop. The objectives are two-fold. First, to provide current information for those persons already participating in hospital pharmacy activity and second, to conduct an exploratory program for the purpose of developing a well rounded and comprehensive syllabus to be set up within the structure of the present undergraduate or postgraduate curriculum now in effect in the college of pharmacy. The Rutgers Pharmaceutical Extension Service administered the program. Representatives of the New Jersey Society of Hospital Pharmacists acted as consultants during the Workshop programs. Hr. Herbert Flack who is associated with the pharmacy department of the Jefferson Medical College acted as moderator

and discussion leader for all scheduled programs. Guest lecturers, experts on certain phases of hospital pharmacy administration, were present during the work shop program. The lecture period was from 4:00 to 5:30. The formal presentation took about forty-five minutes and the additional time was taken for discussion by the class membership. A fee of \$5.00 was charged for the Work Shop.—The annual seminar lectures were conducted at weekly intervals in March. The subjects discussed by specialists in their respective fields were cancer research, geriatrics, diabetics and endocrines. The seminar was sponsored by the college and the Northern New Jersey Branch of the American Pharmaceutical Association.—Recent speakers before the student branch and their topics were: Mr. Frank Dondero, Public Health Service (Staten Island), "The Pharmacist in Public Health"; Dr. Maria Salvanayagam, M.D., "Medicine and Pharmacy in India"; Dr. Albert B. Pacini, consulting editor, Chemistry, Cosmetic-Drugs and Allied Industries, "Cosmetics, Present and Future"; and Lt. Col. Henry D. Roth, Medical Service Corps-Department of the Army, "Pharmacy Activity Within the Service".

**Medical College of South Carolina.**—The School of Pharmacy has moved into the new quarters in the new Cancer Research Wing. It occupies the entire fourth floor and while a large amount of additional space has not been gained the arrangement has been vastly improved.

**University of South Carolina.**—As a token of affection and esteem for the late Dean E. T. Motley, Members of the Fifth District Pharmaceutical Association of South Carolina have furnished, completely, the new office of the former dean and a suitable plaque has been placed on the desk in memory of him. Members of the student branch have solicited contributions for the painting of an oil portrait of Dean Motley. The portrait is finished and will be unveiled during the dedication of the new science building in April.—Registration for the spring semester which began February 5, totals 139.—The Scott Drug Company of Charlotte, North Carolina has established an annual award of \$150.00 to a deserving and satisfactory pharmacy student, preferably a resident of North or South Carolina.—The Women's Auxiliary of the Fifth District Pharmaceutical Association will award funds to pharmacy students in need of financial assistance as recommended by the pharmacy staff.—Prof. James M. Plaxco, Jr., has obtained leave of absence in order to pursue work leading to the doctorate at the University of Florida.

**University of Southern California.**—The first meetings of the extension seminar program recently inaugurated were held in Bakersfield, California when a series of six weekly evening programs began on February 25. Thirty pharmacists attended the lectures and discussions which were sponsored by the pharmacy alumni association of that area. Similar seminars have been requested by groups in San Diego, San Bernardino and the San Joaquin Valley. A series of ten weekly meetings will begin on the local campus on March 12 for the pharmacists of Los Angeles.—Campus organizations swelled their numbers

with recent initiation ceremonies. Rho Chi initiated twelve new members at a dinner meeting with Dr. John Biles speaking on "The Pharmacist and His Neighbors". Phi Delta Chi honored fourteen initiates at a dinner dance at the Pasadena Athletic Club, and six new members of Lambda Kappa Sigma are wearing pins bestowed upon them at a recent candlelight ceremony and dinner. Rho Pi Phi received nine pledges into membership on March 29 at Rudi's Italian Inn with Prof. E. S. Brady as speaker.

**Southwestern State College.**—The present enrollment including pre-pharmacy students, is 115.—Twenty-one seniors will be graduated in May.—Faculty members and a number of seniors attended the meetings of the American College of Apothecaries held in Oklahoma City in February.—Faculty and senior students also attended district meetings of the Oklahoma Pharmaceutical Association held at Chickasha and at Snyder. At the latter place Dean Strother spoke on the subject of the need of training more professional pharmacists.—Mr. Donald Torbert, a senior pharmacy student was honored by being named "College Rotarian of the Month" by the Weatherford Rotary Club.—Three members of the senior class have earned the B.S. degree from other colleges.

**St. Louis College of Pharmacy and Allied Sciences.**—The annual refresher course for practicing pharmacists was held on March 5, with 140 registrants. The following subjects were discussed in the program: Dental Improvement Through Fluoridation of Municipal Water Systems; Surprises in Cancer Research; Where Your Net Profit Comes From; The Status of the Five and the Six-Year Courses; Our Experience with Self-Service; The Application and Enforcement of the New Pharmacy Permit Law; New Medicinals; and Prescription Clinics.—Eleven colleges and six state boards were represented at the meeting of District No. 6 in St. Louis in March. Special guests in attendance were Dr. P. H. Costello and Dean Edward C. Reif.—Dr. George F. Reddish discussed "Antiseptics and Germicides" at the February meeting of the local Society of Analysts.—Dr. Frank L. Mercer spoke on, "Medicinal Herbs Still in Use" before the St. Louis Herb Society at its February meeting at the Missouri Botanical Garden.—Prof. Charles C. Rabe addressed the St. Louis branch of the A.Ph.A. in February.—A ten percent decrease in registration for the second semester has reduced the enrollment to 235. The peak of enrollment in this college was 421 in 1949-1950.

**Temple University.**—Dean Joseph B. Sprcwlz addressed the Delaware County Pharmaceutical Association on January 12, on the topic, "Substitution". On February 10, he spoke to the Oak Lane Review Club on the subject, "From Alchemy to Antibiotics", and on February 26, he addressed the Mercer County Pharmaceutical Association and Medical Interns at their interprofessional relations meeting.—Drs. Cobe, Livingston, and Eby attended the recent District No. 2 meeting in Albany and Drs. Livingston and Cobe participated as members of a panel concerned

with the teaching of the biological sciences.—Dr. Martin recently took part in an interprofessional panel for Temple University senior medical students and spoke on the topic, "The Philosophical Basis of Science". Drs. James, Laquer, and Martin presented a seminar to the Montgomery County Pharmaceutical Association in March on the subject of recent drug developments with emphasis on chlorophyll and the newer hormones.

**University of Texas.**—Thirty seniors were graduated at the February commencement. The following received the master's degree: Mrs. Knox Meyer in pharmacology; Mrs. Esther Jane Wood Hall in pharmacy; William J. Campbell in pharmacy; and Jose Moreno in pharmacy. Mrs. Meyer has returned to retail pharmacy practice in Houston; Mrs. Hall is assistant professor in pharmacy; Mr. Moreno is instructor in pharmacy; and Mr. Campbell is continuing in graduate work.—Latest grants to the Pharmaceutical Research Foundation total approximately \$50,000. They include gifts from the Armour Laboratories, the S. E. Massengill Company, the Owens-Illinois Glass Company, Sharpe and Dohme, Inc., Eli Lilly and Company, the Walter Cousins, Sr., Memorial Library Fund, the Alcon Laboratories, the Schering Corporation, the Ward Drug Company, and several gifts from Texas alumni and pharmacists.—The fifth annual seminar for hospital pharmacists was held in April. The featured speakers were Walter N. Frazier, chief pharmacist at the Springfield City Hospital of Springfield, Ohio, and Mrs. Jane Rogan, chief pharmacist of the Evangelical Deaconess Hospital of Detroit, Michigan.—The National Convention of Kappa Epsilon was held in Austin in April.—Kappa Psi has initiated fourteen new members recently.—One graduate and thirteen undergraduates have been elected to membership in Rho Chi the current semester.—Prof. Vernon A. Green spoke before two high school classes on March 13, on the sociological aspects of drug addiction.—Dr. W. R. Lloyd took his class in ethical proprieties on a tour visiting the firms of the Texas Pharmacal Company, and McKesson-Robbins Drug Company in San Antonio, in March.—Dean Burlage accompanied the senior class on a tour of Parke, Davis and Company, and the Upjohn Company during the Easter vacation.—At the annual "Honors Day" program in March, five pharmacy students received awards for superior scholarship.—Mrs. Esther Jane Wood Hall, assistant professor of pharmacy administration has been chosen to participate in the Walgreen seminar in drug store management to be held in Chicago beginning in June.—Prof. William J. Scheffield attended a seminar on veterinary products and merchandising sponsored by the Globe Manufacturing Company, held in Waco, Texas, in March.

**Texas Southern University.**—All departments have completed moving into the new pharmacy building and all laboratories are now functioning.—Prof. Joseph S. Alexander has been elected 1953 president of the Houston Pharmaceutical Association.—At the monthly faculty seminar, Mr. W. A. Sibley, instructor in physiology, presented a paper on

"Studies on the Artificial Production of Ergot".—Displays of Pharmaceutical Specialties representing several drug manufacturers now fill the display cases in the model drug store adjoining the dispensing laboratory. One three-hour period each week in the dispensing course is devoted to the study of these specialties.—On February 23 and 24, the school was host to Dr. Melvin W. Green, educational director of the American Council of Pharmaceutical Education and Dr. Robert P. Fischelis, secretary of the American Pharmaceutical Association. The student branch called a special meeting to meet and hear Dr. Fischelis and the Mortar and Pestle Club, the student body organization, sponsored an afternoon "mixer" to acquaint the students with Dr. Green and members of the Texas pharmacy board.—Having recently returned from a trip to Parke, Davis and Company and the Upjohn Company, the students are now actively engaged in a fund raising campaign to finance an educational trip to a manufacturing house in the east next year.—On August 3-5 the school will be host to the National Pharmaceutical Association.

**University of Utah.** In a contest for 100% membership in the student branch, the junior class won. The senior class made the grade a day later. The freshman and sophomores had enough members to bring the over-all membership into the high eighties, percentage wise.—By unanimous vote of the faculty, the Smith-Faus Drug Company, a division of the Brunswick Company, award of \$500 went to Dale B. Loveridge, a junior student.—The local A.Ph.A. convention committee is making every effort to include the students in their planning for the convention in August. If possible they are going to replace the conventional two-hour student session by a full day of well planned activity for students.

**Medical College of Virginia.**—Dr. J. W. Boenigk attended the meeting of District No. 2 at Albany, New York in March.—A state-wide pharmacy seminar was conducted in Richmond early in April, co-sponsored by the school and the Virginia Pharmaceutical Association. The theme of the program was, "Pharmacology and Therapeutics of New Drugs".—Dr. Warren E. Weaver spoke at a joint meeting of the medical and pharmaceutical societies of Bedford County in Bedford on February 24. The topic presented was, "Sulfonamides and Antibiotics".—The local Phi Gamma Epsilon Sorority was installed on March 20, as a national organization, a chapter of Kappa Epsilon.—Prof. Frank P. Pitts lectured recently before the Society of Automotive Engineers on "Nuclear Energy".—A program leading to the degree of Master of Arts in Hospital Pharmacy has been approved by the Committee on Graduate Study, and will be initiated in September 1953.

**State College of Washington.**—Dean and Mrs. Haakon Bang accompanied a group of forty-one students on a ten day educational tour of the Abbott, the Parke-Davis, and the Lilly plants recently.—Drs. M. R. Gibson and A. I. White have been awarded grants-in-aid for \$2,000 and \$1650 respectively by the college research committee to continue their

research projects.—Donald French, senior pharmacy student, has been awarded a \$100 scholarship which is given annually by the Crimson Circle (Men's Honorary of Washington State College) to an outstanding member of the student body.—New equipment recently received includes a Bird kymograph, a tensometer for indirect blood pressure measurements on small animals, a convection incubator, a horizontal autoclave, a lyophilising apparatus, and a vacuum oven.—The Washington State College Pharmacist is a new annual student publication due to appear in April. Robert McAlexander, a junior student, is editor.

**University of Washington.**—Dr. Edward Krupski accompanied eighteen upper classmen on a tour of the Parke, Davis and the Eli Lilly plants in April.—Dr. Elmer M. Plein recently gave a television demonstration of some of the professional techniques in pharmacy. He showed the manufacture of tablet triturates using a plastic mold, and some compounding techniques that are normally conducted at the prescription counter.—Dr. Louis Fischer met with the province officers of Kappa Psi at Corvallis, Oregon, in March, making plans for a coming province meeting to be held in Portland.—A grant of \$3,500 has been given Dr. Heber W. Youngken, Jr., by the Eli Lilly Company to support an investigation of the chemical and pharmacological principles of various drug plants.—Prof. Hiroshi Mitauashi, a member of the pharmacognosy staff at the University of Tokyo has registered for the doctorate, under a foreign students' exchange scholarship. His research will be on plant growth regulators under the guidance of Dr. Heber W. Youngken, Jr.—Dr. Youngken, in March, visited the University of California where he consulted with others concerning the work of the Audio-Visual Committee of the AACP. He also visited the University of Utah where he assisted in planning the program of the Summer Seminar on Pharmacognosy which is to be held in Salt Lake City prior to the pharmaceutical convention to be held in August.—The College of Pharmacy refresher course was held on the campus in April. The program was evenly divided between professional subjects and management problems.

**Wayne University.**—Dean Roland T. Lahey spoke before the Torch Club of Detroit lately on "The History of Pharmacy in Pictures."—On March 24, the Detroit Retail Druggists' Association gave a luncheon in honor of Dean Lahey who will retire from the deanship on June 30.—The pharmacy library was moved into new and permanent quarters in the Kreage-Science Building on April 2. The library is now a separate collection from the Kreage-Hooker chemistry collection.—The new pharmacy catalog came out in April. It has been entirely redesigned so as to make it a source of information for students about pharmacy as a profession as well as about the curriculum.

**University of Wisconsin.**—The architects plans have been completed and funds released for an addition to the Chemistry Building that will further improve and expand facilities of the School of Pharmacy.—The School is collaborating with its alumni to form a School Alumni



Association.—The second of a series of a series of off-campus professional conferences for pharmacists was held at Wausau April 15. The program, a condensed version of the 1952 Wisconsin Pharmacists Institute, is under the direction of William S. Apple, coordinator of the School's extension services. The printed "Proceedings" of the complete 1952 Institute, which was distributed to all schools of pharmacy, has drawn extensive favorable comment.—The National Heart Institute has renewed its grant for research on sabadilla alkaloids under the direction of Drs. Lloyd M. Parks and Takeru Higuchi.—Research on the analysis of organic acids, directed by Dr. Higuchi, is being supported by the C. P. Hall Co.—William S. Apple, instructor in pharmacy administration, has been selected to participate with faculty members from eleven other schools in the drugstore management seminar sponsored by the Walgreen Company as a member of the Foundation for Economic Education.—An article on "Pharmaceutical Education" in the February 15 issue of **Higher Education** was contributed by Drs. Glenn Sonnedecker and George Urdang.—At the District 4 meeting of boards and colleges at Ann Arbor in April, Dr. Dale E. Wurster presented a paper titled, "In What Ways Can the A.A.C.P. Best Serve Its Member Colleges?"—In January Dr. Takeru Higuchi spoke at the Smith, Kline and French Laboratories and at Merck and Company, and visited the Army Chemical Center, Maryland, in connection with government research being conducted at the School. Dr. Higuchi participated in a seminar at the Army Chemical Center in March.—The forty-five graduate students currently enrolled were addressed on March 10 by Drs. William Bittenbender and Theodore Macek of Merck and Company.—There were 306 undergraduates, exclusive of pre-pharmacy students, enrolled during the second semester.

**University of Wyoming.**—Five members of the pharmacy staff attended the Rocky Mountain Drug Conference in Denver in February. The Conference was set up on a round-table discussion basis and topics sent in by the faculties, the association officers, members of boards of pharmacy, and association members served as a basic program.—The pharmacy and pharmacology courses which have been given to nurses in the sophomore year have been reorganized to provide some training in pharmacy to nurses in the freshman year.—James O'Flannigan, Sherry Martin, and Albert Rodriguez are holders of American Foundation for Pharmaceutical Education scholarships for the current year.—Dr. Theodore O. King and Dean David W. O'Day have been appointed as members of the Awards Committee and the Membership Committee, respectively, of the Wyoming Section of the American Chemical Society for 1953.—Dr. John Reed of the botany department was the guest speaker at the March meeting of the Wyoming chapter of Sigma Xi. He told of his experiences while engaged in botanical work in the Belgian Congo, when he was on leave in 1951.

## Miscellaneous Items of Interest

### THE CONFERENCE OF TEACHERS

The by-laws which were adopted at the 1951 meeting in Buffalo and printed in the July 1952 number of *The Journal*, authorize the officers and the committees of the Conference of Teachers. For the year 1952-53 they are as follows:

Chairman—Heber W. Youngken, Jr., University of Washington.

Vice-Chairman—Paul C. Olsen, Philadelphia College of Pharmacy and Science.

Secretary-Treasurer—E. P. Claus, University of Pittsburgh.

Immediate Past Chairman—H. G. Hewitt, University of Connecticut.

Standing Committees: (Article VIII, Section 1)

Committee on By-laws—John F. McCloskey, Chairman, Harold G. Hewitt, Melvin W. Green.

Committee on Resolutions—Ewart A. Swinyard, Chairman, William R. Lloyd, Donald C. Brodie.

Committee on Program—Edward P. Claus, Chairman, Herman O. Thompson, George Hager.

Committee on Membership—Paul C. Olson, Chairman, Joseph B. Sprowls.

Auditing Committee—Hugh C. Muldoon, Chairman, Stephen Wilson.

Among the current problems to be discussed by the Conference and Sections are the following:

1. A proposal for representation from the Conference for membership on the Executive Committee of the AACP.

2. A proposal for establishing an Executive Board of the Conference of Teachers whose duties shall be to recommend policy.

3. A proposal to clarify allocations of funds received by the Conference and the Sections.

4. A proposal to improve the present procedure (Article XI, Section 7) for amending the By-laws of the Conference.

The following officers of the American Pharmaceutical Association have been elected by mail vote and will be installed at the annual convention in Salt Lake City, Utah, the week of August 16, 1953:

President-Elect, F. Royce Franzoni, Washington, D. C.

First Vice-President-Elect, John A. McCartney, Detroit, Michigan.

Second Vice-President-Elect, Joseph B. Sprowls, Temple University, Philadelphia, Pennsylvania.

Members-Elect of the Council for a term of three years:

Don E. Francke, University of Michigan, Ann Arbor.

Roy L. Sanford, Enid, Oklahoma.

Robert L. Swain, New York.

The Honorary President, the Secretary and the Treasurer are elected by the House of Delegates at the next annual meeting.

The officers for the current year are:

President, R. Q. Richards, Fort Myers, Florida.

First Vice-President, Tom D. Rowe, Ann Arbor, Michigan.

Second Vice-President, Charles F. Lanwermyer, Waukegan, Illinois.

Honorary President, Rufus A. Lyman, Lincoln, Nebraska.

Secretary, Robert P. Fischelis, Washington, D. C.

Treasurer, Hugo H. Schaefer, Brooklyn, New York.

The following officers were elected by the American College of Apothecaries for the year 1952-1953 at the Eleventh Annual Convention in Philadelphia:

President, John B. Heinz, Salt Lake City, Utah.

President-Elect, Louis B. Longaker, Philadelphia, Pennsylvania.

Vice-President, Louis J. Fischl, Oakland, California.

Treasurer, Charles V. Selby, Clarksburg, West Virginia.

Secretary, Robert E. Abrams, Philadelphia, Pennsylvania.

Members of the Board of Directors:

Region 4, R. V. Oosting, Grand Rapids, Michigan.

Region 8, Louis J. Fischl, Oakland, California.

**The Teachers' Seminar on Pharmacognosy and the Plant Science Seminar** meetings will be held in Salt Lake City, Utah during the week of August 10 to 14, 1953. An outstanding program has been arranged including faculty members assigned as follows:

Dr. L. David Hiner, University of Utah

Dr. Heber W. Youngken, Jr., University of Washington

Dr. E. P. Claus, University of Pittsburgh

Dr. Troy C. Daniels, University of California

Dr. Joseph B. Burt, University of Nebraska

Dean Louis C. Zopf, State University of Iowa

Dr. Arthur E. Schwarting, University of Connecticut

Dr. Willis R. Brewer, University of Arizona

Dr. Maynard W. Quimby, Massachusetts College of Pharmacy

Dr. Frank L. Mercer, St. Louis College of Pharmacy

Dr. Stephen D. Durrant, University of Utah

Dr. Richard A. Deno, University of Michigan

Dr. Ewart A. Swinyard, University of Utah

Dr. Jack E. Orr, Montana State University

Dr. Lloyd E. Blauch, Dept. of Health, Education and Welfare, Office of Education, Washington, D. C.

Dr. Sydney W. Angleman, University of Utah

Dr. M. Gibson, Washington State College

Dr. J. A. Reese, University of Kansas

Dr. J. Hampton Hoch, Medical College of South Carolina

Dr. Heber W. Youngken, Sr., Massachusetts College of Pharmacy

Dr. C. C. Albers, University of Texas  
Dr. Robertson Pratt, University of California  
Dr. George E. Osborne, University of Utah  
Dr. Thomas J. Parmely, University of Utah  
Dr. Edward C. Fingl, University of Utah

All of these men are experts in their respective fields and will be on hand to lecture and lead discussions relative to their major fields of specialization.

Additional plans call for special exhibits and field trips into the nearby canyons and mountains.

Reservations should be made by writing to Dean L. David Hiner, Chairman of the Seminar, University of Utah College of Pharmacy, Salt Lake City, Utah.

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## New in the Family

**Judith Clair Lurensky.**—Born January 31, 1952, daughter of Prof. and Mrs. Maurice L. Lurensky, New England College of Pharmacy.

**Mark Alan Greenwald.**—Born April 11, 1952, son of Prof. and Mrs. Samuel Greenwald, New England College of Pharmacy.

**John Eddy Marshall.**—Born August 15, 1952, son of Prof. and Mrs. Alton L. F. Marshall, New England College of Pharmacy.

**John Harvey Inashima.**—Born November 1, 1952, son of Prof. and Mrs. O. James Inashima, New England College of Pharmacy.

**Joseph Dana Kern.**—Born December 6, 1952, son of Joseph and Mrs. Shermania Kern, Ohio State University.

**Thomas Scott Nesbitt.**—Born December 22, 1952, son and third child of Dr. and Mrs. William R. Nesbitt, University of Wyoming.

**Linda Anne Krause.**—Born February 6, 1953, daughter of Prof. and Mrs. George Krause, Rutgers University.

**Anette Michele Iannarone.**—Born February 11, 1953, daughter of Prof. and Mrs. Michael Iannarone, Rutgers University.

**Blake Fuqua Putney, Jr.**—Born January 12, 1953, son of Dr. and Mrs. Blake Putney, Rutgers University.

**Hal Robert Wernik.**—Born January 28, 1953, son of Mr. and Mrs. Donald Wernik, Rutgers University.

**Peter Rogers Decaneas.**—Born February 18, 1953, son of Dr. and Mrs. Demetre J. Decaneas, New England College of Pharmacy.

**Barry Lloyd Lichtin.**—Born January 27, 1953, son of Prof. and Mrs. J. Leon Lichtin, University of Cincinnati College of Pharmacy.

**Robert William Garcia.**—Born February 21, 1953, son of Mr. and Mrs. Roberto Garcia, third great grandchild of Dr. and Mrs. R. A. Lyman, University of Nebraska.

## The American Foundation for Pharmaceutical Education

A meeting of the Executive Committee was held in the Hotel Biltmore in New York City on March 4, 1953. All the directors were present either in person or by proxy except Mr. George V. Doerr who was unavoidably absent.

President H. A. B. Dunning presented an informal and comprehensive review of the work of the Committee since its last meeting on September 22, 1952. He called attention to its major activities, expressed satisfaction with the progress made and had confidence in the growing capacity of the Foundation.

The Secretary summarized the main items prepared for inclusion in his annual report to the members of the Board of Directors. The summary was accepted and the following actions taken, based upon the items detailed in the report:

The President was directed to appoint an Editorial Committee with authority to establish principles and procedures for listing Patrons, in the event the Board of Directors approves the recommendation of the Executive Committee to publish a list of Patrons of the Foundation.

The Secretary's recommendation that the office of the Foundation be moved to Washington, D. C., at an early practical date was endorsed and referred with recommendation for approval to the Board of Directors.

Treasurer Howard B. Fonda presented a preliminary report of the second quarter audit (as of February 28, 1953) and advised that expenses were being kept within the appropriated budget. He commented on the encouraging steady increase in contributions over the past two years and expressed confidence that, in the near future, income would be materially higher and would enable the Foundation to operate on a balanced budget. He presented the Finance Committee's budget for 1953-54 and advised, as a matter of principle, that expenses should be forced toward income even if some temporary reduction in appropriations was necessary. He emphasized the need for maintaining a reserve sufficient to carry the Foundation for a period of three years. The Executive Committee accepted this proposal as being basically sound. However in the light of the urgent needs of pharmaceutical education and the encouraging signs of broader and larger financial support expected from industry, the Executive Committee considered it advisable to provide adequately for every proper and productive program of pharmaceutical education, even if to do so would require temporary, limited, deficit financing. Provision was made to meet any emergency which might arise in the near future.

After a thorough discussion, the proposed budget for 1953-54 was approved. It provided a few slight changes in the allocation of funds.

In the main it is the same as the budget for 1952-53. No new items have been added.

Dr. Hugo Schaefer, reporting as chairman of the Special Committee, stated that after a careful study and expressions from the Board of Grants, it did not appear necessary at this time to require applicants for Fellowships to formally subscribe to a loyalty oath since there was no evidence of disloyalty among past or current Fellows and because adequate precautions are being observed to insure that Fellowship grants are being awarded to proper and deserving students. The report was accepted and the Special Committee discharges.

Mr. Beardsley discussed plans to encourage graduate Fellows to repay their grants when financially able to do so. The Secretary stated that he had received encouraging inquiries from Fellows and he believed most of them would respond to a call for their support. The Executive Committee endorsed plans for contacting and inviting Fellows to contribute to the 1954 solicitation campaign.

Dr. R. L. Swain outlined his plans for soliciting support from practicing pharmacists and funds were allocated for implementing the program.

After considering other routine items the Committee adjourned.

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**The Annual Meeting of the Members of the American Foundation for Pharmaceutical Education** was held in the Hotel Biltmore, New York City, New York on April 6, 1953. All member associations were represented by proxy and all Directors were present except seven who were unable to attend because of conflicting engagements but were represented by proxy.

Section I of Article III of the By-laws was amended so as to increase the number constituting the Board of Directors from thirty to thirty-five as the Board might determine from time to time.

The Secretary read the report of the Nominating Committee recommending the reelection of Directors Lilly, Levis and Beardsley for five year terms, expiring in 1958, and the election, as Directors, of Francis Boyer, W. L. Dempsey, F. S. Dickinson, Jr., and Charles D. Doerr, also for five-year terms, expiring in 1958. The reelection and election of these men as directors was approved by unanimous ballot. Joseph B. Burt and Louis C. Zopf will continue as Directors by virtue of occupying the offices respectively of Chairman of the Executive Committee and Secretary-Treasurer of the AACP.

The President was directed to appoint a special committee to recommend appropriate change in the By-Laws to establish a more satisfactory date for the annual meeting.

The Secretary was instructed to confer with counsel and carry out such required procedures to the end that Mr. George V. Doerr could be properly elected as Honorary President of the Foundation because of his long and distinguished service.



The 1953 meeting of the **Board of Directors of the American Foundation for Pharmaceutical Education** was held in the Hotel Biltmore, New York, New York, April 6, 1953.

President Dunning, presiding, reported on the activities of the Foundation during the past year, expressed appreciation for the support he had received, satisfaction with progress made, and confidence in the future growth, strength and services of the Foundation. The report was received and the Board unanimously registered its appreciation for his unselfish and constructive services to the Foundation, over the years, and especially as President during 1952-53.

The Directors approved the recommendation of the Executive Committee relative to the publication of a list of the Patrons of the Foundation and the Secretary's recommendation that the office of the Foundation be moved to Washington, D. C.

Officers unanimously recommended by the Nominating Committee for one year terms were President, Robert L. Swain; Vice-President, James J. Kerrigan; Treasurer, Howard B. Fonda; Secretary, W. Paul Briggs; Counsel, James F. Hogue.

For members of the Executive Committee: C. S. Beardsley, Howard C. Newton, Hugo H. Schaefer, Charles D. Doerr, H. A. B. Dunning, and Harry J. Loynd.

For re-election to the Board of Grants for a five-year term: Robert Lincoln McNeil.

For reappointment as Executive Director, for a three-year term through March 31, 1957: W. Paul Briggs.

The Secretary was instructed to cast a unanimous ballot for each nominee. This was accomplished.

Dr. Little stated he was heartily in favor of requiring an appropriate statement from all applicants to insure their loyalty to the United States. After discussion a special committee was named to prepare a suitable declaration to be required of all AFPE Fellows. The Personnel of the committee appointed was President Swain, Counsel Hogue, and Secretary Briggs. The declaration was prepared and adopted and reads as follows:

"I am not now and never have been a member of any organization affiliated with the communist party, or having as the objectives thereof or of any other organization advocating overthrow of the United States Government by force."

Many members expressed their opinions as to the proposed effort to enlist the support of retailers to the Foundation. President Swain noted the various views and suggestions and indicated that he would undertake to make the program serve a useful purpose to the benefit of the Foundation.

Treasurer Fonda read his report as treasurer and also the report of the Finance Committee of which he was chairman. These reports were received and their contents discussed and recommendations ap-

proved as indicated in this abstract of the minutes of the various organizations within the framework of the American Council of Pharmaceutical Education, after which adjournment followed.

Rufus A. Lyman, Abstractor

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## New Books

**Die Botanische Buchillustration, Ihre Geschichte und Bibliographie** by Claus Nissen. Two volumes in quato, bound together in one volume (vol. 1: VII + 264 pages; vol. 2: VI + 320 pages). Publisher: Hiersemann Verlag, Stuttgart, Germany, 1951. Price: DM.120.—(about \$30.)

This is one of those encyclopedic reference books the necessity of which has been recognized through the ages and which nevertheless remained a desideratum, approached but not realized for a very simple reason: the complexity of the task asking for an amount and variety of knowledge, for a degree of accuracy and scholarship and, last but not least, for a gift of literary presentation, very rarely combined in one person.

In our case, the botanical book illustration—its history and bibliography, the fortunate constellation on the literary sky has happened. The particular task and the man able and willing to master it have met. The product is this extraordinary book covering not the one or the other aspect but the total area of the field under consideration. This reviewer harbors an instinctive aversion toward the "blurbs" with which publishers accompany the products of their authors. In this case, however, he agrees so completely that he thinks it best to quote the following from the statement made by the "Hiersemann Verlag".

"This work of the librarian of the City of Mainz, Dr. Claus Nissen, represents the first complete survey of the botanical book illustration of all countries and all times since the invention of printing. . . . Up to the present there was no reference book allowing the checking of the completeness of copies of the books concerned, the determination of author, title, number of pages and illustrations, artists and publishers, and of the exact date of publication. There was, furthermore, no summarizing survey informative of the literary, artistic, and scientific interrelations and interdependencies which, for this reason, have as yet mainly remained uncleared".

This gap has now been closed. In the excellent history of the botanical book illustration (vol. 1) this interrelationship and interdependence has found a unique discussion offering new views and the clarification of a number of much debated problems. Its value is, there-

fore, by no means limited to the professionalists in the field, the botanists, artists, and librarians, but will become evident to everyone interested in the history of Western culture at large. A completely new feature is offered in the comprehensive biographical notes on the artists who were responsible for the illustrations.

It is understood that no library of any importance can be without this book. At this place it is worth mentioning that the part of pharmacy in the field concerned has been given adequate attention. It may finally be stated that the bibliographical part of the book (vol. 2), devoted to the authors of the publications listed, to the periodicals concerned, to the illustrations, and to the plants dealt with, does not offer any linguistic difficulty. As to the historical part, its excellent style should make it a preferred means of practising German reading for everyone interested in the subject matter.—George Urdang.

**University of California Hospital Formulary and Compendium of Useful Information** compiled by the Hospital Pharmacy Committee of the University of California Medical Center, Troy C. Daniels, Ph.D., Chairman. 1952. Second Edition. 318 pp. The University of California Press (Berkeley 4). Price \$3.75.

The Formulary is more than a formulary in the usual sense. It is a handbook of useful information dealing with the handling and use of drugs and diagnostic agents. Staff members and students are urged to select drugs from the U.S.P., the N.F. and the N.N.R. for priority of drugs and for the sake of economy. Certain agents not found in the official compendia but which have a therapeutic usefulness are included but are marked "not official". The Therapeutic Index lists drugs classified according to their use and therapeutic uses are indicated in the Drug List. The fact is stressed that the Formulary is intended as a ready reference only and not as a source book of information. The manual has to be prepared personally for a full appreciation of its usefulness. While it was intended for the use of the personnel of the University of California Medical Center, it will be found useful everywhere and will be of equal value to the student, the medical practitioner and the practicing pharmacist.—R.A.L.

**The Organization and Administration of Intramural Sports** by Louis E. Means, Consultant in School Recreation, Bureau of Health Education, Physical Education, and Recreation, California State Department of Education. 1952. Second Edition. 466 pp. 240 Illustrations. C. V. Mosby Company. Price \$5.75.

In revising the text additions have been made in practically every chapter. The material on girls' and women's programs has been enlarged. The illustrations and other mechanics of the text are excellent. The book will certainly be of value to those colleges of pharmacy that conduct their own recreational program.—R.A.L.

**Pharmaceutical Arithmetic** by Ignatius J. Bellafiore, Assistant Professor of Pharmacy, St. John's University College of Pharmacy. 1953. Third Edition. 226 pp. The C. V. Mosby Company. Price \$4.50.

The size of the book has been reduced by eliminating the blank work sheets which were in the former editions. Many changes have been made. The titles of official substances have been made to conform with the official compendia; the section on isotonic solutions has been completely revised; problems on antibiotics and vitamins have been distributed throughout the text instead of segregating them; since tablets have come to be used so widely, prescriptions for their use have been included; the number of popular specialties have been increased because of the greater attention being paid them in the curricula; emphasis is placed upon the importance of accurate arithmetic leading to the correct answer and a section on business arithmetic has been added. These changes should increase the popularity of this widely used book.—R.A.L.

**Textbook of Physiology** by William D. Zoethout, Ph.D., Professor Emeritus of Physiology in the Chicago College of Dental Surgery (Loyola University) and W. W. Tuttle, Ph.D., Professor of Physiology, College of Medicine, State University of Iowa. 1952. Eleventh Edition, 692 pp. 302 Text Illustrations and 5 Color Plates. The C. V. Mosby Company. Price \$4.75.

The original intention of the author to supply a text to fill the gap between the briefer course texts and the more comprehensive ones, of which there are many, has been followed in this edition. It has been thoroughly revised in line with the newer conceptions. A glossary adds to the convenience of students and the list of selected readings has been enlarged. A text that has held its course through eleven editions means that it has found a place in courses on the college level.—R.A.L.

**Dispensers' Manual** by R. Mansoor, B.S., M.D., D.P.H., Professor of Pharmacology in the F. J. Medical College for Women, Lahore, India. 1953. 400 pp. Illustrated. University Book Agency, Kacheri Road, Lahore. Price Rs. 7-8-0.

Of this book the author says, "This book has been written to meet the needs of the probationer and qualified dispensers, as well as those of the medical students, as far as their curriculum in relation to pharmacy is concerned."

"Some of the chapters in this book may, on superficial inspection, seem very elementary and superfluous for a student equipped with a certain amount of basic education. But experience has proved that it is these very elementary, but all the same, very essential principles and rules, which during the onward march on the road of knowledge, are the quickest and the easiest to be relegated to oblivion.

"Repetition of an item, provided it served the attainment of casting an indelible impression on the memory of the student, has been freely practiced. For this breach of convention, apology is neither called for nor tendered."

That last paragraph expresses a philosophy which our own text book writers and curriculum builders who are frightened by a single repetition or duplication, might well give thoughtful consideration.

The book is divided into two parts. The first deals with the theory of dispensing and the second, with its art and practice. There are four appendices which give useful information for quick reference.

The author states, "The profession of dispensing, like that of medicine, is not only good, but also honorable. The physician and the dispenser are very useful and respectable members of any society, but only so long as they uphold the tenets and dignity of their professions by deeds."

"The dispenser of today is expected to have a much vaster knowledge than the compounder of the times gone by, and hence his or her training must be more intensive and elaborate."

The author then makes a statement for the guidance of a would-be entrant who desires to become a qualified dispenser. Above all he states, "A probationer dispenser should be at least a matriculate." This indicates a degree of maturity and a real interest in following the profession. Other requisites are: "(1) be intelligent and diligent, (2) be capable of meeting exigencies with a quick and calm mind, (3) be neat, careful, and smart in his or her work, (4) never say or do anything of which he or she is not absolutely certain, (5) be capable of improvising, when and where necessary and permissible, (6) be self-respecting and respectful to others, (7) be able to inspire confidence in his or her ability as a dispenser, (8) consider the dispensary as sacred premises where gossip or loose talk is sacrilegious, (9) be pleasant and cheerful in demeanor, but never boisterous, too familiar or melancholic, (10) strictly confine himself or herself to his or her duties and responsibilities as a dispenser, and never vaunt any opinion about the prescription, the prescriber, disease or the treatment, (11) never dispense any ingredients which have not been prescribed in the prescription, neither add anything or omit any item of his or her own record, (12) never use substitutes except with the written permission of the prescriber, (13) in case of any doubt, overdose or incompatibility, refer the matter to the prescriber in secret, either verbally, or in the form of a message along with the prescription, in a sealed cover, (14) be eternally loyal to Truth, the Profession, himself, his clientele, and his employer." And then he adds, "Always keep in mind that an efficient dispenser is a million times more honorable and useful than a quack doctor."

As I read these simple and direct statements, devoid of verbosity, it seemed to me here was a code of professional ethics inferior to none that have been written, and I realized that not all of the high professional idealism is the exclusive property of our beloved country.—R.A.L.

**Pharmacology and Pharmacotherapeutics for Dentists** by William H. O. McGehee, D.D.S., M.D., F.A.C.D., formerly Professor of Dental Pharmacology and Therapeutics and Dean of the Dental Department, Medical College of Virginia and Melvin W. Green, B.S., Ph.D., Associate Professor of Pharmaceutical Chemistry, University of Wisconsin. 1952. Fourth Edition. 550 pp. Illustrated. The Blakiston Company. Price, \$7.50.

The first section of the book deals with the basic principles of pharmacology and prescription writing. The second section covers the drugs used by the dentist chiefly for their local action on the mouth and teeth. The third discusses the local acting drugs that alter the inflammatory process. The fourth section deals with local acting drugs on the gastro intestinal tract and includes the purgatives and emetics. Section five covers the drugs affecting sensory nerves (local anesthetics) and section six covers those acting chiefly on the central nervous system. They include the central stimulants, central depressants and those inducing anesthesia. The remaining sections cover the drugs acting on the autonomic nervous system and the pharmacology of the metals, the specifics, the vitamins and the hormones, stressing those phases of action and use which the scientific dentist needs to know in the practice of his profession. Each chapter is followed by a list of approved pharmaceutical preparations and a list of important references to original sources. An appendix is provided which covers the symptoms and treatment of acute poisoning, a table of solubility of important drugs, a table of approximate dose equivalents, method of computation of thermometric equivalents, tables of percentage solutions, suggestions as to laboratory studies, and a dental formulary and prescription guide.

It seems the authors have presented the subject in an ideal way for the student of dentistry as well as for the practitioner. The text should be known to the student and practitioner of pharmacy since dental pharmacy has become a subject of major importance to the pharmaceutical profession.—R.A.L.

**Scientific Principles in Nursing** by M. Esther McClain, R.N., B.S., M.S., Instructor in Nursing Arts, Providence Hospital School of Nursing, Detroit, Michigan. 1953. Second Edition. 449 pp. Illustrated. The C. V. Mosby Company. Price \$3.50.

In the First Edition of this text the author stated, "The purpose of this book is to show how some basic scientific principles may be used in nursing practice. Nursing procedures are carried out more intelligently if the nurse understands the reasons behind her methods. Principles provide a safe guide for performance. If the principles are well understood and applied, the method is a good one." There is no better reason for writing a book than the author has here expressed and in writing this text she has well fulfilled her purpose. In revising the Second Edition each chapter has been extended and some of the chapters have been rearranged in order to obtain a better sequence of textual material. Many new illustrations have been added to demonstrate principles mentioned in the text. Thirty-two pages of references, chapter by chapter are given in the back of the text which constitute an excellent bibliography for the enquiring student. This is the kind of book pharmacy students should read in order to give them a knowledge and sympathetic understanding of the ever increasing importance of the nursing profession.—R.A.L.



**The Pharmaceutical Industry** by Robert A. Hardt, former Vice-President, E. R. Squibb and Sons, New York. No. 9 in the series of American Industries. 32 pages, illustrated. The Bellman Publishing Company, Inc. Cambridge 38, Massachusetts. Price \$1.

The author of this well written and elegantly printed little brochure is the son of a pharmacist, a graduate of the University of Nebraska College of Pharmacy and was engaged in retail pharmacy and served on the Nebraska Board of Pharmacy Examiners before he joined E. R. Squibb and Sons as a salesman in the Des Moines, Iowa, area in 1926. Since then he has held the following positions with that firm: Manager, Chicago Branch Office; Field Supervisor; Manager, Hospital Division; Products Sales Manager; Assistant Sales Manager; Director, Product Development; and Vice-President. In 1946 he joined the Hoffmann-LaRoche, Inc., where he is Vice-President in Charge of Sales and Advertising, a member of the Board of Directors and of the Executive Committee. He has long been prominent in the American Pharmaceutical Manufacturers Association. This record of accomplishment is given to show the author's qualifications to write on the subject "The Pharmaceutical Industry". In the Introduction he gives a description of the industry, the classification of products, the magnitude of the industry, the classification of manufacturers and the industrial development. The chapters which follow deal with the history, geographical location, value of basic training in the sciences, personnel, salaries and wages, labor movement, advantages and disadvantages, opportunities for women, trends of the industry, research, trade associations, and closes with a list of periodicals and a bibliography.

The author writes without waste of words and very much to the point in describing the opportunities in the industrial field. The presentation will be of interest to anyone engaged in the pharmaceutical activities but will be especially useful to the students of pharmacy in directing their attention to the opportunities in the various aspects of the industrial field and what it takes to qualify for special positions.—R.A.L.

**Pharmaceutical Jurisprudence** by Sol. A. Herzog, A.B., LL.B., Lecturer in Pharmaceutical Jurisprudence, College of Pharmacy, Columbia University. 1952. 221 pp. Columbia University Bookstore (2960 Broadway, New York). Price \$6.00.

There are ten chapters and an appendix. The chapters cover the following subjects: preliminary discussion of government organization and procedure; practice of pharmacology and operation of establishments; disciplinary and punitive proceedings; poisons; barbiturates, hypnotic and procedure; practice of pharmacology and operation of establishments; and somniferous drugs, narcotics, new drugs; adulteration and misbranding; common law liability of the pharmacist; miscellaneous and related provisions. The last chapter covers such problems as statutory exemptions, working hours, fair trade, labor relations, and ownership of

prescriptions. The appendix gives the code of ethics of the New York Pharmaceutical Association and the code of the American Pharmaceutical Association and a table of cases cited in the chapter on Common Law Liability of the Pharmacist.

It takes courage for a individual to write a text upon the subject of pharmaceutical jurisprudence because of the vastness of the area and the variety of material due to the fact that pharmaceutical practice is regulated by federal law, state statute, municipal ordinance, administrative regulations and ruling, and common law precept.

The author speaks correctly when he says, "An encyclopedic handling of this subject would require a text many times the size of this one. Consequently two limitations have been self imposed: delineation of basic and fundamental principles only, and primary emphasis upon the law of the State of New York."

The basic principles which the author has discussed have a country wide application and a study of the specific laws of a certain state cuts a pattern for study of regulations of other states.

The text appears in mimeograph form with paper covers. After it has been tried out in the class room it is the intention to publish it in permanent form.—R.A.L.

**The Official Preparations of Pharmacy** by Charles Oren Lee, Ph.D., Professor of Pharmacy, Purdue University School of Pharmacy. 1953. Second Edition. 544 pp. Illustrated. C. V. Mosby Company. Price \$3.50.

The author has followed the plan of the First Edition and has brought the textual material into conformity with the United States Pharmacopoeia XIV, and the National Formulary IX. Many definitions and descriptions have been rewritten, especially those pertaining to ampules, tablets, and capsules. The trade name of many preparations and a brief statement as to the major action has been added to the tabulated information. The author's long experience in the teaching field has led him to write understandingly to the student.—R.A.L.

**Facts and Comparisons.** Edited by Erwin K. Kastrup, B.S. 1953. 314 pp. Inclusive of an Alphabetical Product Index for 1953. Facts and Comparisons, Inc., 3137 S. Grand Blvd., St. Louis, Mo. Price \$5.00.

The 1952 issue of this loose leave reference work was reviewed in the October 1952 issue of the Journal. The 1953 edition is enlarged, is supplied with tabbed index and printed on high quality stiff paper which makes easy and rapid finding of the wanted information. It is kept up to date through the year by the issuance of information about new products. The grouping of drugs on a pharmacologic basis is invaluable. The ease with which identical products bearing different names can be found can only be appreciated by a study of the mechanics of the work. It would seem to the writer that Facts and Comparisons is indispensable for both the busy physician and practicing pharmacist.—R.A.L.

**The Professional Interfraternity Council** at Ohio State University held its annual meeting early in March at which time an outstanding member of two fraternities was honored. There are fifteen professional fraternities on the campus and this year it was the turn for Phi Delta Chi to present a member. Xi Chapter selected Dr. Justin L. Powers of Alpha Chapter. Dr. Powers came to Columbus as a guest of the chapter to receive the honor. As is well known, Dr. Powers is an outstanding man in American Pharmacy. Since leaving the teaching field at his alma mater, the University of Michigan, he has been in the office of the American Pharmaceutical Association in Washington, editor of its publications, director of its laboratory, and closely identified with the National Formulary work. Grand Secretary Rand P. Holleback is urging all chapters of Phi Delta Chi to take an active part in the work of the Professional Interfraternity Council in their respective universities and report their activities to the office of the Grand Secretary in Columbus, Ohio.

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**Dr. Odin W. Anderson** has been appointed director of research for Health Information Foundation. Dr. Anderson will direct the Foundation's research program which is carried on by its own research staff and (through grants of funds) by research groups in colleges and universities. Included in the program are studies on methods of payment for medical care, community self-surveys of health facilities and services, medical public relations and child health. The Foundation is also participating with other organizations in backing a study on hospital care financing.

Dr. Anderson, from 1942 to 1949 conducted research and served as instructor in the Bureau of Public Health Economics of the School of Public Health at the University of Michigan. He has carried field work in medical care programs in Washington, Michigan, Rhode Island and Washington, D.C. In 1949 he joined the faculty of the University of Western Ontario as associate professor in the socio-economic aspects of medicine. In the summer of 1951 he was a World Health Organization Fellow in preventive medicine to Great Britain and the Scandinavian countries. He is an extensive author. His own current research is in the problem of disease and society.

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**Mr. Done E. Francke**, chief pharmacist at University Hospital, Ann Arbor, Michigan, has been named recipient of the 1953 H.A.K. Whitney award presented by the Michigan Society of Hospital Pharmacists. The presentation will be made at a testimonial dinner to be held in Detroit on May 7. Mr. Francke was the 1952-53 president of the American Pharmaceutical Association and has recently been re-elected to the Council of that Organization. He is a consultant to the Surgeon-General of the

Army and to the Veterans Administration, and holds a reserve commission in the U. S. Public Health Service. His broad interests in pharmacy, while maintaining his proficiency as chief pharmacist of Michigan University Hospital, encompass numerous organizations and activities. He has served for a number of years on the Committee on Pharmacy of the American Hospital Association and has been re-elected recently to the Council of the American Pharmaceutical Association.

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The first number of a new magazine published by the L. M. (Lallubhai Motilal) College of Pharmacy, Ahmedabad, India, appeared in January, 1953. It gives the history of the origin of the college and states its plans for the future as being a force in the development of professional practice and the development of pharmaceutical industry in that vast country. The Principal of the College, Dr. R. P. Patel, is Chairman of the Magazine Committee, and Prof. H. R. Deserari of the faculty is the editor. Contributions to the magazine are made by both students and faculty. They include articles of all shades and color, academic and otherwise. As the years pass, the committee expects the publication to become more academic and less literary, more critical and less general.

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## INSTITUTIONS HOLDING MEMBERSHIP IN THE AMERICAN ASSOCIATION OF COLLEGES OF PHARMACY

### New Mexico

University of New Mexico, College of  
Pharmacy, Albuquerque. (1952)  
E. L. Catalina, Dean

### New York

University of Buffalo, School of Phar-  
macy, Buffalo. (1939)  
A. B. Lemon, Dean  
Columbia University, College of Phar-  
macy of the City of New York. (1939)  
E. E. Lenallen, Dean  
Fordham University, College of Phar-  
macy, New York. (1939)  
James H. Kidder, Dean  
Long Island University, Brooklyn Col-  
lege of Pharmacy, Brooklyn. (1939)  
Hugo H. Shaefer, Dean  
St. John's University, College of Phar-  
macy, Brooklyn. (1951)  
John L. Dandreaux, Dean  
Union University, Albany College of  
Pharmacy, Albany. (1945)  
Francis J. O'Brien, Dean

### North Carolina

University of North Carolina, School  
of Pharmacy, Chapel Hill. (1917)  
E. A. Brecht, Dean

### North Dakota

North Dakota Agricultural College,  
School of Pharmacy, Fargo. (1922)  
W. F. Sudro, Dean

### Ohio

Ohio Northern University, College of  
Pharmacy, Ada. (1925)  
Albert C. Smith, Dean  
University of Cincinnati, Cincinnati  
College of Pharmacy. (1947)  
J. F. Kowalewski, Dean  
Ohio State University, College of  
Pharmacy, Columbus. (1900)  
B. V. Christensen, Dean  
University of Toledo, College of Phar-  
macy, Toledo. (1941)  
Charles H. Larwood, Dean

### Oklahoma

Southwestern State College, School of  
Pharmacy, Weatherford. (1951)  
W. D. Strother, Dean  
University of Oklahoma, College of  
Pharmacy, Norman. (1905)  
Ralph W. Clark, Dean

### Oregon

Oregon State College, School of Phar-  
macy, Corvallis. (1915)  
George E. Crossen, Dean

### Pennsylvania

Duquesne University, School of Phar-  
macy, Pittsburgh. (1927)  
Hugh C. Muldoon, Dean  
Philadelphia College of Pharmacy and  
Science, Philadelphia. (1900)  
Ivor Griffith, Dean  
Temple University, School of Pharma-  
cy, Philadelphia. (1928)  
Joseph B. Sprowla, Dean  
University of Pittsburgh, School of  
Pharmacy, Pittsburgh. (1900)  
Edward C. Reif, Dean

### Philippines

University of the Philippines, College  
of Pharmacy, Quezon City. (1917)  
Patrocinio Valenzuela, Dean

### Puerto Rico

University of Puerto Rico, College of  
Pharmacy, Rio Piedras. (1926)  
Luis Torres-Diaz, Dean

### Rhode Island

Rhode Island College of Pharmacy and  
Allied Sciences, Providence. (1926)  
W. Henry Rivard, Dean

### South Carolina

Medical College of South Carolina,  
Charleston. (1940)  
William A. Prout, Dean  
University of South Carolina, School  
of Pharmacy, Columbia. (1928)  
Robert W. Morrison, Acting Dean

### South Dakota

South Dakota State College, Division  
of Pharmacy, Brookings. (1908)  
Floyd J. LeBlanc, Dean

### Tennessee

University of Tennessee, School of  
Pharmacy, Memphis. (1914)  
Robert L. Crowe, Dean

### Texas

Texas Southern University, School of  
Pharmacy, Houston. (1952)  
Hurd M. Jones, Dean  
University of Houston, College of  
Pharmacy, Houston. (1952)  
M. M. Ferguson, Dean  
University of Texas, College of Phar-  
macy, Austin. (1926)  
Henry M. Burleigh, Dean

### Utah

University of Utah, College of Phar-  
macy, Salt Lake City. (1951)  
L. David Hiner, Dean

### Virginia

Medical College of Virginia, School of  
Pharmacy, Richmond. (1908)  
R. B. Smith, Dean

### Washington

State College of Washington, School of  
Pharmacy, Pullman. (1912)  
Haakon Bang, Dean  
University of Washington, College of  
Pharmacy, Seattle. (1903)  
Forest J. Goodrich, Dean

### West Virginia

West Virginia University, College of  
Pharmacy, Morgantown. (1920)  
J. Lester Hayman, Dean

### Wisconsin

University of Wisconsin, School of  
Pharmacy, Madison. (1900)  
Arthur H. Uhl, Dean

### Wyoming

University of Wyoming, College of  
Pharmacy, Laramie. (1951)  
David W. O'Day, Dean

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## **FELLOWSHIPS IN PHARMACY**

To meet the demonstrated need for trained teachers and researchers in the field of pharmacy, the American Foundation for Pharmaceutical Education announces a limited number of Fellowships for students seeking graduate degrees in pharmaceutical subjects.

These Fellowships are open to students (men or women) qualified for registration in approved graduate schools (or colleges) for one or more of the following major fields:

**PHARMACY  
PHARMACEUTICAL CHEMISTRY  
PHARMACOLOGY  
PHARMACOGNOSY  
PHARMACY ADMINISTRATION  
(or closely related subjects)**

Each Fellow will receive from the Foundation a stipend to cover the period of his appointment and, when not provided for from other sources, an allowance for academic expenses. Normally, new Fellowships are started only in September and February. New applications and requests for renewals of grants should be submitted at least 60 days prior to desired starting date or expiration date. Fellowships are renewable.

For further information concerning Foundation Fellowships, including application forms, write directly to the

**Secretary.**

**AMERICAN FOUNDATION FOR PHARMACEUTICAL  
EDUCATION**

**1450 Broadway**

**New York 18, N. Y.**

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